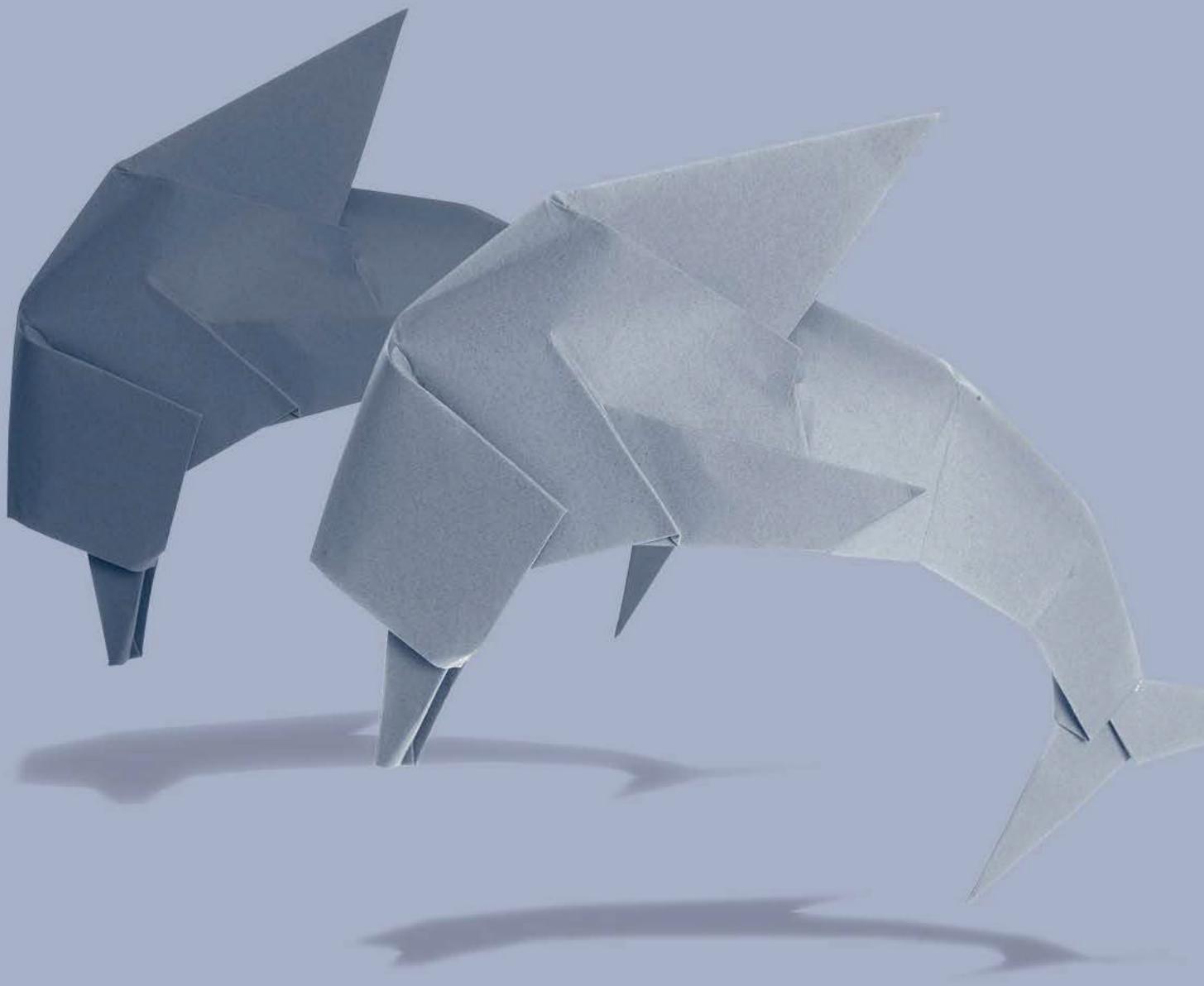
edexcel

# GCSE (9-1) Mathematics



## SPECIMEN PAPERS SET 2

Pearson Edexcel Level 1/Level 2 GCSE (9-1) in Mathematics (1MA1)

ALWAYS LEARNING

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# Contents

# Introduction

These specimen papers have been produced to complement the sample assessment materials for Pearson Edexcel Level 1/ Level 2 GCSE (9-1) in Mathematics and are designed to provide extra practice for your students. The specimen papers are part of a suite of support materials offered by Pearson.

The specimen papers do not form part of the accredited materials for this qualification.

## General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

**1** All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive.

**2** All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

**Questions where working is not required**: In general, the correct answer should be given full marks.
**Questions that specifically require working**: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

**3 Crossed out work**
This should be marked **unless** the candidate has replaced it with an alternative response.

**4 Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

**5 Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

**6 Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

**7 Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).

**8 Probability**

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**9 Linear equations**

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

**10 Range of answers**

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

| Guidance on the use of abbreviations within this mark scheme | |
|---|---|
| **M** | method mark awarded for a correct method or partial method |
| **P** | process mark awarded for a correct process as part of a problem solving question |
| **A** | accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details) |
| **C** | communication mark |
| **B** | unconditional accuracy mark (no method needed) |
| **oe** | or equivalent |
| **cao** | correct answer only |
| **ft** | follow through (when appropriate as per mark scheme) |
| **sc** | special case |
| **dep** | dependent (on a previous mark) |
| **indep** | independent |
| **awrt** | answer which rounds to |
| **isw** | ignore subsequent working |

Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

Centre Number | | | | | |

Candidate Number | | | | |

# Mathematics

## Paper 1 (Non-Calculator)

**Foundation Tier**

| Specimen Papers Set 2 | Paper Reference |
|---|---|
| **Time: 1 hour 30 minutes** | **1MA1/1F** |

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

## Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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S 5 0 1 5 5 A 0 1 1 6

PEARSON

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** Find 10% of £320

£.....

**(Total for Question 1 is 1 mark)**

**2** Write 0.8 as a percentage.

..... %

**(Total for Question 2 is 1 mark)**

**3** (a) Work out $84 \div 3$

.....

**(1)**

(b) Work out $0.17 \times 6000$

.....

**(1)**

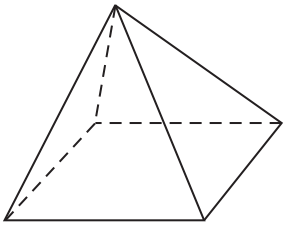
(c) Work out $(-2)^3$

.....

**(1)**

**(Total for Question 3 is 3 marks)**

**4** Here is a square-based pyramid.



(i) How many faces does the pyramid have?

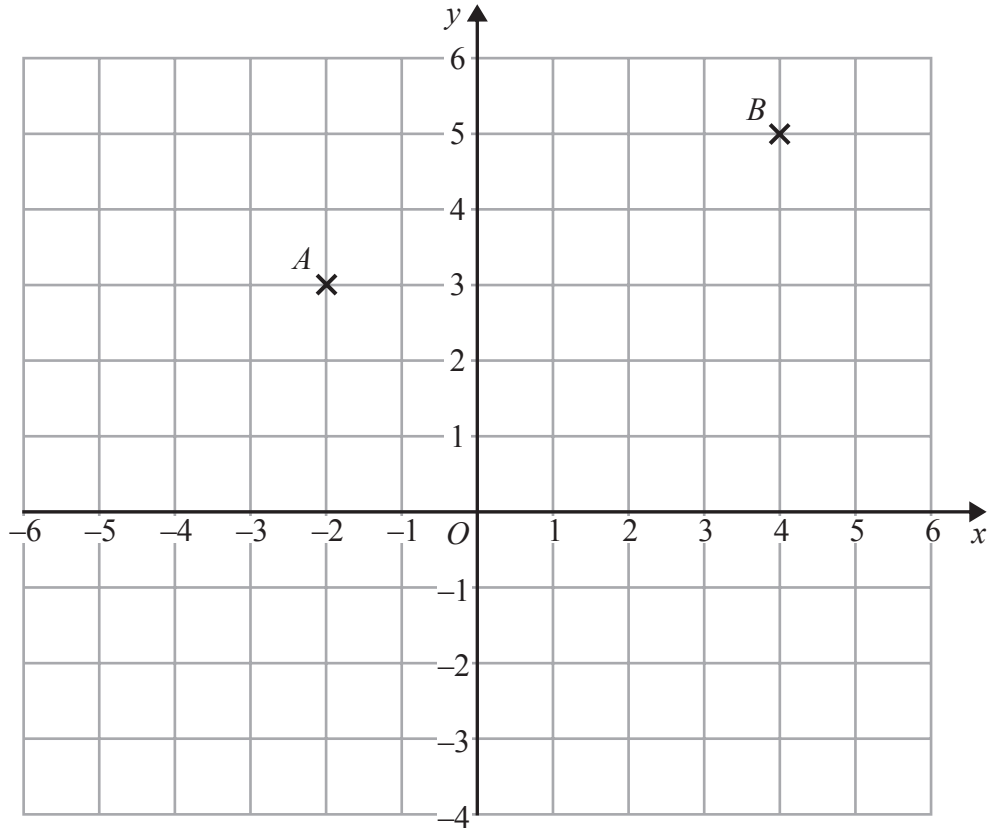
.....

(ii) How many edges does the pyramid have?

.....

**(Total for Question 4 is 2 marks)**

**5**




(a) Write down the coordinates of point $B$.

(.....  , .....)

**(1)**

(b) Find the coordinates of the midpoint of $AB$.

(.....  , .....)

**(1)**

(c) On the grid, draw the line with equation $y = -3$

**(1)**

**(Total for Question 5 is 3 marks)**

**6** Here are the instructions for making a drink.

| |
|---|
| Add 100 m*l* of juice<br>to 2 litres of water |

Dev uses 5 litres of water to make the drink.

How much drink has he made?

.....

**(Total for Question 6 is 3 marks)**

**7** In a box there are three types of chocolates.

There are 6 plain chocolates,
8 milk chocolates
and 10 white chocolates.

Ben takes at random a chocolate from the box.

(a) Write down the probability that Ben takes a plain chocolate.

.....

**(2)**

Deon takes 2 chocolates from the box.

(b) Write down all the possible combinations of types of chocolates that Deon can take.

.....

.....

.....

**(2)**

**(Total for Question 7 is 4 marks)**

**8** 8 identical pens cost £12
Work out the cost of 10 of these pens.

£.....

**(Total for Question 8 is 2 marks)**

**9** Here are five fractions.

$$\frac{2}{8} \quad \frac{10}{40} \quad \frac{12}{48} \quad \frac{5}{24} \quad \frac{20}{80}$$

One of these fractions is **not** equivalent to $\frac{1}{4}$

(a) Write down this fraction.

.....

**(1)**

(b) Work out $\frac{2}{7} + \frac{1}{14}$

.....

**(2)**

(c) Work out $\frac{4}{5} \div \frac{3}{10}$
Give your answer in its simplest form.

.....

**(2)**

**(Total for Question 9 is 5 marks)**

**10** (a) Solve $3x + 7 = 1$

$x =$ .....

**(2)**

(b) $f = 6$
$g = 5$

Work out the value of $3f - 2g$

.....

**(2)**

**(Total for Question 10 is 4 marks)**

**11** Write down three different multiples of 4 that add up to 40

.....

**(Total for Question 11 is 2 marks)**

**12** Helen has 80 books to sell.

Each book is Fiction or Non-fiction.
The ratio of the number of Fiction books to the number of Non-fiction books is 3:1

Each book has a normal price of £10
Helen reduces the price of all the Non-fiction books.

| **Non-fiction** |
| --- |
| All books<br>½ price |

Helen sells all 80 books.

Work out the total amount of money Helen will receive.

£.....

**(Total for Question 12 is 4 marks)**

**13** Ryan and Carl each get paid a basic pay of £60 per day.

One day, Ryan also gets a bonus of 25% of his basic pay.
Carl also gets £20 in tips from customers.

Work out the difference between the total amounts of money that Ryan and Carl each get.

.....

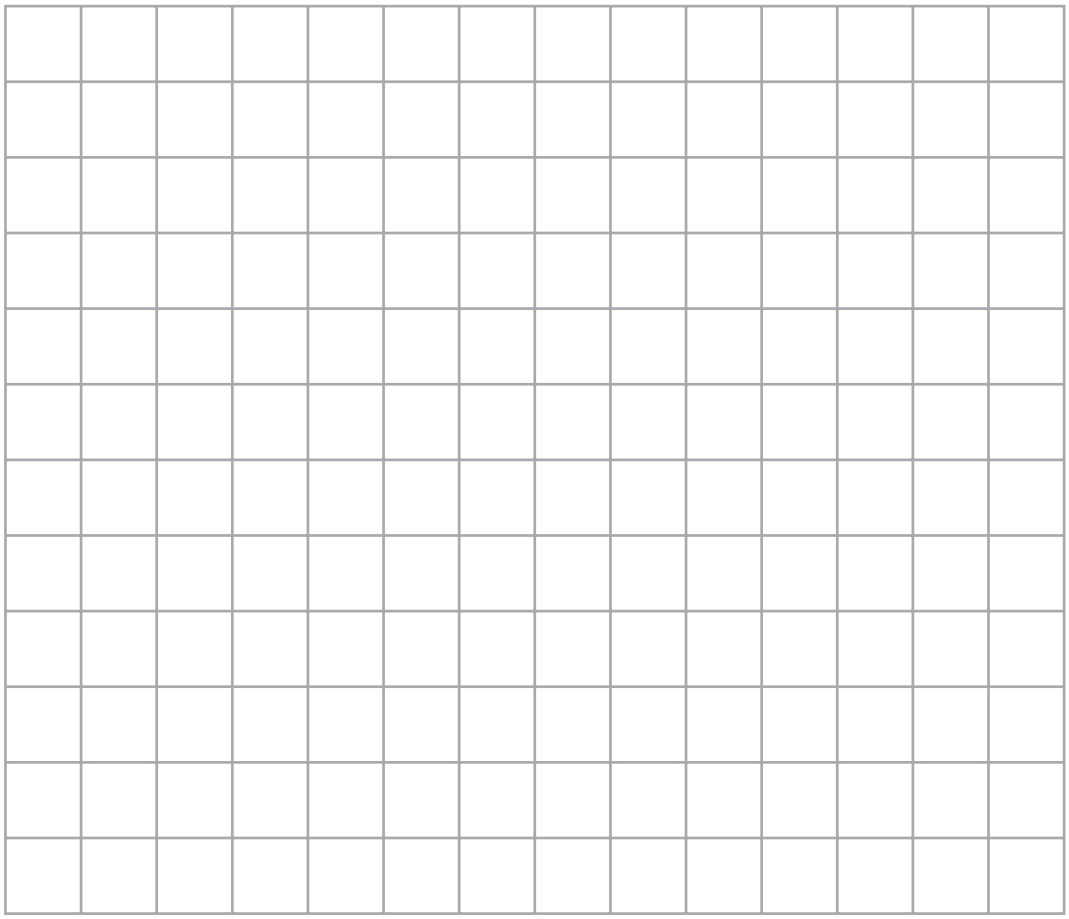
**(Total for Question 13 is 3 marks)**

**14** Some people were asked if they liked swimming or cycling or running.

The table shows the results for the males and the results for the females.

| | **Swimming** | **Cycling** | **Running** |
|---|---|---|---|
| **Male** | 2 | 6 | 4 |
| **Female** | 8 | 5 | 5 |

(a) On the grid, draw a bar chart to show this information.



**(4)**

(b) Work out the percentage of the 30 people that are female.

..... %

**(2)**

**(Total for Question 14 is 6 marks)**

**15** The table shows information about the ages of all the people at a party.

| Age (years) | Frequency |
|---|---|
| 11 − 20 | 6 |
| 21 − 30 | 16 |
| 31 − 40 | 10 |
| 41 − 50 | 8 |

(a) Work out the total number of these people who were aged 40 or less.

.....

**(1)**

Andy says that the range of ages is 39 years because 50 – 11 = 39

(b) The range may not be 39 years.
Explain why.

.....

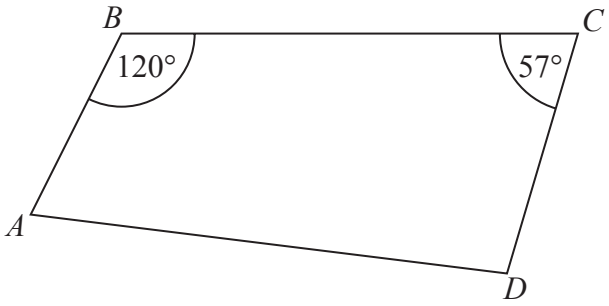
.....

.....

**(1)**

**(Total for Question 15 is 2 marks)**

**16** The diagram shows a quadrilateral *ABCD*.




Is *AB* parallel to *DC*?
You must give your reasoning.

**(Total for Question 16 is 3 marks)**

**17** Irena sells ice creams.
One day she sells 80 ice creams.
The next day she sells 108 ice creams.

Work out the percentage increase in the number of ice creams she sells.

..... %

**(Total for Question 17 is 3 marks)**

**18** Dimitar has 20 sweets.
Pip also has 20 sweets.

Dimitar gives Pip $x$ sweets.

Dimitar then eats 5 of his sweets.
Pip then eats half of her sweets.

Write expressions for the number of sweets Dimitar and Pip now have.

Dimitar .....  Pip .....

**(Total for Question 18 is 3 marks)**

**19** (a) Factorise $y^2 + 27y$

.....

**(1)**

(b) Simplify $(t^3)^2$

.....

**(1)**

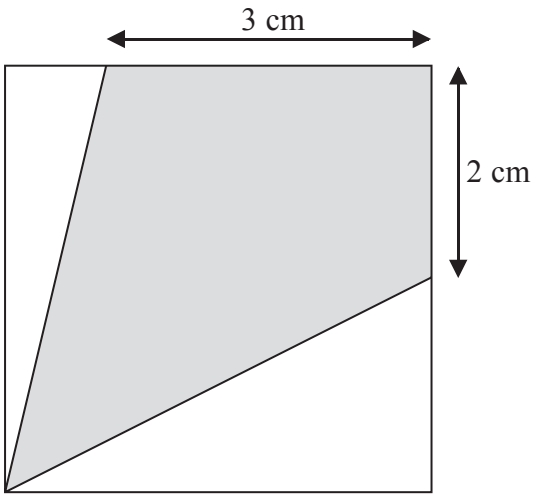
(c) Simplify $\frac{w^9}{w^4}$

.....

**(1)**

**(Total for Question 19 is 3 marks)**

**20** The diagram shows a square with perimeter 16 cm.



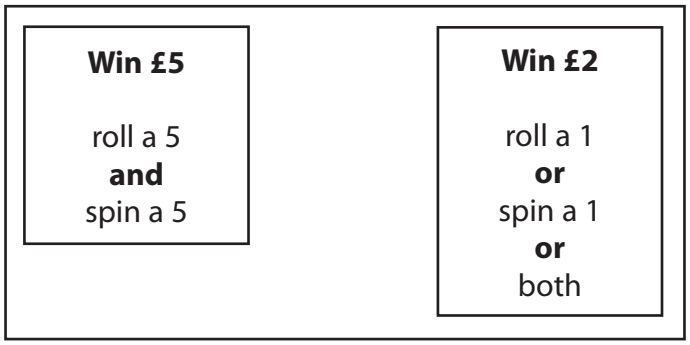

Work out the proportion of the area inside the square that is shaded.

.....

**(Total for Question 20 is 5 marks)**

**21** David has designed a game.
He uses a fair 6-sided dice and a fair 5-sided spinner.
The dice is numbered 1 to 6
The spinner is numbered 1 to 5

Each player rolls the dice once and spins the spinner once.
A player can win £5 or win £2




David expects 30 people will play his game.
Each person will pay David £1 to play the game.

(a) Work out how much profit David can expect to make.

£.....

**(4)**

(b) Give a reason why David's actual profit may be different to the profit he expects to make.

.....

.....

**(1)**

**(Total for Question 21 is 5 marks)**

DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA
DO NOT WRITE IN THIS AREA

**22** Triangle $ABC$ has perimeter 20 cm.

$AB = 7$ cm.
$BC = 4$ cm.

By calculation, deduce whether triangle $ABC$ is a right-angled triangle.

**(Total for Question 22 is 4 marks)**

**23** One sheet of A3 card has area $\frac{1}{8}$ m$^2$.

The card has a mass of 160 g per m$^2$.

Work out the total mass of 25 sheets of A3 card.

**(Total for Question 23 is 4 marks)**

**24** Here are the first five terms of a sequence.

2 8 18 32 50

(a) Find the next term of this sequence.

.....

**(1)**

The $n$th term of a different sequence is $3n^2 - 10$

(b) Work out the 5th term of this sequence.

.....

**(1)**

**(Total for Question 24 is 2 marks)**

**25** Write 504 as a product of powers of its prime factors.

.....

**(Total for Question 25 is 3 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

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| Paper 1MA1: 1F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 1 | | 32 | B1 |
| 2 | | 80 | B1 |
| 3 a | | 28 | B1 |
| b | | 1020 | B1 |
| c | | −8 | B1 |
| 4 i | | 5 | B1 |
| ii | | 8 | B1 |
| 5 a | | (4, 5) | B1 |
| b | | (1, 4) | B1 |
| c | | Correct line | B1 |
| 6 | | 5.25 litres | P1 for start to process eg. 5 ÷ 2 (=2.5)<br>P1 for complete process eg. 5000 + 2.5×100<br>A1 or 5250 m*l* |

| Paper 1MA1: 1F | | | | |
|---|---|---|---|---|
| Question | | Working | Answer | Notes |
| 7 | a | | $\frac{1}{4}$ | M1 For $\frac{x}{24}$ with $x < 24$ or $\frac{6}{y}$ with $y > 6$<br>A1 for $\frac{6}{24}$ oe |
| | b | | PP PM PW<br>MM MW WW | M1 At least 3 correct combinations<br>A1 Fully correct list with no extras or permutations |
| 8 | | | 15 | M1 For start to scaling process eg 12÷8 or 10÷8<br>A1 15 |
| 9 | a | | $\frac{5}{24}$ | B1 |
| | b | | $\frac{5}{14}$ | M1 For using a correct common denominator<br>A1 For $\frac{5}{14}$ oe |
| | c | | $2\frac{2}{3}$ | M1 for $\frac{4}{5} \times \frac{10}{3}$ oe<br>A1 for $2\frac{2}{3}$ or $\frac{8}{3}$ |

| Paper 1MA1: 1F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 10 a | | −2 | M1 For subtraction of 7 from both sides or division of all terms by 3 as first step of solution<br>A1 cao |
| b | | 8 | M1 For substitution 3×6 − 2×5<br>A1 cao |
| 11 | | 8, 12, 20 **or** 4, 8, 28 **or** 4, 12, 24 **or** 4, 16, 20 | P1 Adds 3 different multiples of 4<br>A1 |
| 12 | | 700 | P1 for process for total non-fiction books eg $\frac{1}{4} \times 80$ (=20)<br>P1 process for total takings for non fiction eg $20 \times \frac{1}{2} \times 10$ (= 100)<br>P1 process to find total takings "100" + 60 × 10<br>A1 700 |
| 13 | £5 | £5 | P1 for $\frac{25}{100} \times 60$<br>P1 for process to find difference between totals 20 – "15"<br>A1 cao |

| Paper 1MA1: 1F | | | | |
|---|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** | |
| 14 a | | chart | C1 | For key or suitable labels to identify male and female |
| | | | C1 | For linear scale |
| | | | C1 | For chart (combined or separate) correctly showing data for at least 2 of swim, run, cycle |
| | | | C1 | Fully correct chart with axes correctly scaled and labelled. |
| b | | 60 | M1 | $\frac{8+5+5}{30}$ or ft their diagram |
| | | | A1 | 60% |
| 15 a | | 32 | B1 | 32 cao |
| b | | Correct reason | C1 | Comment about grouped data in context |
| 16 | | No with reason | M1 | Starting reasoning 120 + 57 (= 177) |
| | | | A1 | Comparison of 177 with 180 |
| | | | C1 | Completes correct reasoning with reference to eg co-interior (or allied) angles total 180 |
| 17 | | 35 | M1 | for method to find increase 108 – 80 (= 28) |
| | | | M1 | for method to find % increase eg $\frac{28}{80} \times 100$ |
| | | | A1 | cao |

| Paper 1MA1: 1F | | | | |
|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Notes** |
| 18 | | | D: $15 - x$<br>P: $\frac{20+x}{2}$ | M1 For writing a correct expression for D or P before sweets are eaten $20 - x$ or $20 + x$<br>A1 One correct expression<br>A1 Both correct expressions |
| 19 | a | | $y(y+27)$ | B1 |
| | b | | $t^6$ | B1 |
| | c | | $w^5$ | B1 |
| 20 | | $16 \div 4$<br>$\frac{1\times4}{2}=2$ or $\frac{1}{2}\times\frac{1}{4}=\frac{1}{8}$<br>$\frac{2\times4}{2}=4$ or $\frac{1}{2}\times\frac{1}{2}=\frac{1}{4}$<br>$\frac{1\times4}{2}+\frac{2\times4}{2}=6$ or $\frac{1}{2}\times\frac{1}{4}+\frac{1}{2}\times\frac{1}{2}=\frac{3}{8}$<br>$16 - 6 = 10$ or $1-\frac{3}{8}=\frac{5}{8}$ | $\frac{5}{8}$ | P1 Using side lengths of 4<br>P1 Method to find fraction or area for one unshaded triangle<br>P1 Method to complete fraction or area for total unshaded region<br>P1 Method to find total fraction or area for shaded region<br>A1 for $\frac{5}{8}$ oe or 0.625 |

| Paper 1MA1: 1F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 21 a | $\frac{1}{6} \times \frac{1}{5} \times 30 \times 5 = 5$<br>$(\frac{5}{6} \times \frac{1}{5} + \frac{1}{6} \times \frac{4}{5} + \frac{1}{6} \times \frac{1}{5}) \times 30 = 10$<br>$30 \times 1 - 5 - 10 \times 2$ | 5 | P1 for identifying correct process to find probabilities for winnng scores. May include use of tree diagram or sample space<br>P1 for correct process to find prize money<br>P1 for completing correct process to find profit<br>A1 cao |
| b | | Explanation | C1 for appropriate comment to interpret result eg probability so only likelihood not certainty, other than 30 may play, £5 is small difference. |
| 22 | | No with reasoning | M1 Derive $AC$=9 cm and identify as hypotenuse<br>M1 $4^2 + 7^2$<br>A1 for using eg $AC = \sqrt{4^2 + 7^2}$ or 65 and 81<br>C1 for concluding explanation that $ABC$ is not a right-angled triangle with evidence. |
| 23 | | 500g | P1 $\frac{1}{8} \times 160$ (=20)<br>P1 '20' × 25<br>A1 500 (or 0.5)<br>B1 Correct units g (or kg) |
| 24 (a) | | 72 | B1 cao |
| (b) | | 65 | B1 cao |

| Paper 1MA1: 1F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 25 | | $2^3 \times 3^2 \times 7$ | M1 for at least 3 correct divisions by a prime factor (may be seen in a factor tree)<br>M1 for 2, 2, 2, 3, 3, 7 (condone inclusion of 1); may be seen in a factor tree<br>A1 |

Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

Centre Number | | | | | |

Candidate Number | | | | |

# Mathematics

## Paper 2 (Calculator)

**Foundation Tier**

| Specimen Papers Set 2 | Paper Reference |
|---|---|
| **Time: 1 hour 30 minutes** | **1MA1/2F** |

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

### Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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S 5 0 1 5 7 A 0 1 2 8

PEARSON

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** Write 6819 to the nearest 1000

.....

**(Total for Question 1 is 1 mark)**

**2** Write these temperatures in order.
Start with the lowest temperature.

7 °C  –2 °C  10 °C  –5 °C  3 °C

.....

**(Total for Question 2 is 1 mark)**

**3** Write 0.075 as a fraction.
Give your fraction in its simplest form.

.....

**(Total for Question 3 is 2 marks)**

**4** Find the value of $5^4$

.....

**(Total for Question 4 is 1 mark)**

**5**

**Living to 100 years old**

1 in 3 babies born last year
are expected to live
to 100 years old

720 000 babies were born last year.

How many of these babies are expected to live to 100 years old?

.....

**(Total for Question 5 is 2 marks)**

**6** Here is part of a train timetable from Swindon to London.

| Swindon to London | | | | | | | |
|---|---|---|---|---|---|---|---|
| Swindon | 06 10 | 06 27 | 06 41 | 06 58 | 07 01 | 07 17 | 07 28 |
| Didcot | 06 27 | 06 45 | 06 58 | – | 07 18 | – | 07 45 |
| Reading | 06 41 | 06 59 | 07 13 | 07 28 | 07 33 | 07 43 | 08 00 |
| London | 07 16 | 07 32 | 07 44 | 08 02 | 08 07 | 08 14 | 08 33 |

(a) How long should the 06 58 train from Swindon take to get to London?

.....

**(1)**

Clare says,

"All these trains take more than one hour to get from Swindon to London."

(b) Is Clare correct?
You must give a reason for your answer.

.....

.....

**(1)**

**(Total for Question 6 is 2 marks)**

**7** Tracy buys

| | | |
|---|---|---|
| 2 coffees at | £1.10 | each |
| 3 teas at | 95p | each |
| 5 sandwiches at | £2.15 | each |

Tracy shares the total cost equally between 5 people.

How much does each person pay?

£ .....

**(Total for Question 7 is 4 marks)**

**8** Rachel carried out a survey of 10 people to find out the type of fruit they like best.

The table gives information about her results.

| Type of fruit | Number of people |
|---|---|
| apple | 2 |
| banana | 5 |
| orange | 3 |

(a) Which type of fruit is the mode?

.....

**(1)**

In Rachel's survey, 2 out of 10 people like apples best.

(b) Write 2 out of 10 as a percentage.

.....%

**(1)**

Pete also carried out a survey to find out the type of fruit people like best.
He asked 30 people which type of fruit they like best.

He drew this pie chart for his results.

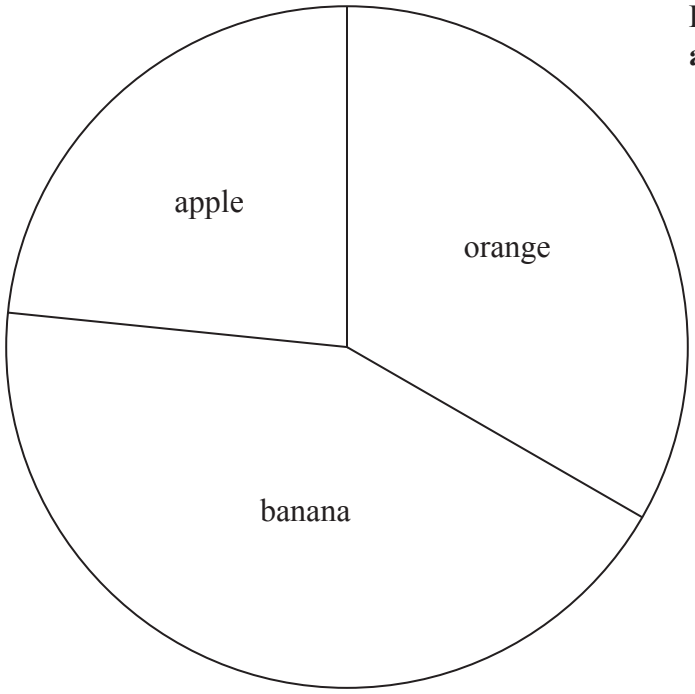



Diagram **accurately** drawn

A smaller proportion of people like bananas best in Pete's survey than in Rachel's survey.

(c) Explain how Pete's pie chart and Rachel's table show this.

.....

.....

.....

**(2)**

**(Total for Question 8 is 4 marks)**

**9** The smallest angle of a triangle is 25°
The triangle is enlarged by scale factor 3

Ben says,

"The smallest angle of the enlarged triangle is 75° because 25 × 3 = 75"

Is Ben right?
Explain your answer.

.....

.....

**(Total for Question 9 is 1 mark)**

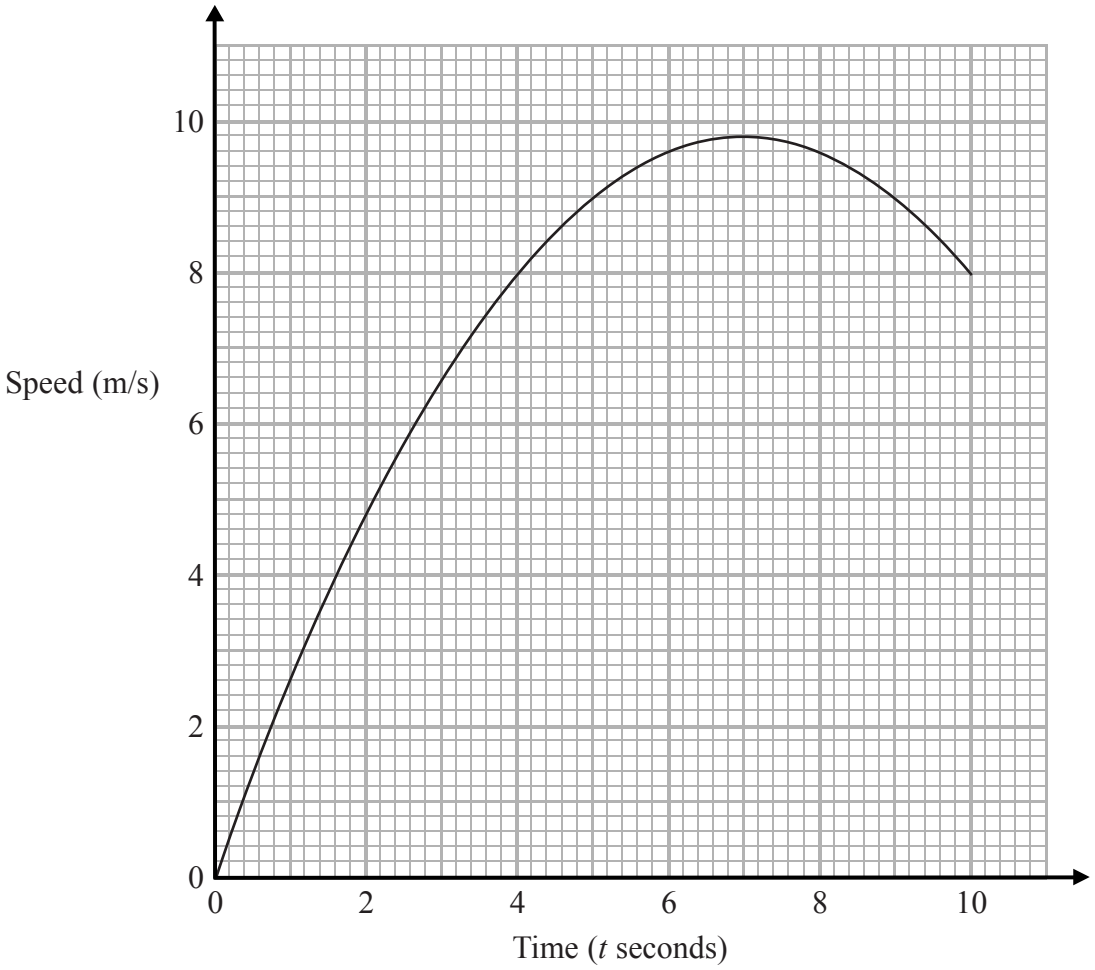
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**10** Karol ran in a race.

The graph shows her speed, in metres per second, $t$ seconds after the start of the race.




(a) Write down Karol's speed 3 seconds after the start of the race.

.....m/s

**(1)**

(b) Write down Karol's greatest speed.

.....m/s

**(1)**

There were two times when Karol's speed was 9 m/s.

(c) Write down these two times.

.....seconds

.....seconds

**(1)**

**(Total for Question 10 is 3 marks)**

**11** The first three terms of a number pattern are 1 2 4

Hester says the first five terms of this number pattern are 1 2 4 8 16

(a) Write down the rule Hester could have used to get the 4th and 5th terms.

.....

**(1)**

(b) Write down the 6th term of Hester's number pattern.

.....

**(1)**

Jack uses a different rule.

He says the first six terms of the number pattern are 1 2 4 7 11 16

(c) Write down the 7th and 8th terms of Jack's number pattern.

....., .....

**(1)**

**(Total for Question 11 is 3 marks)**

**12** Martin has 8 pints of soup in a pan.
He also has 24 soup bowls.
He puts 0.3 pints of soup into each bowl.

How much soup has Martin left over?

.....pints

**(Total for Question 12 is 3 marks)**

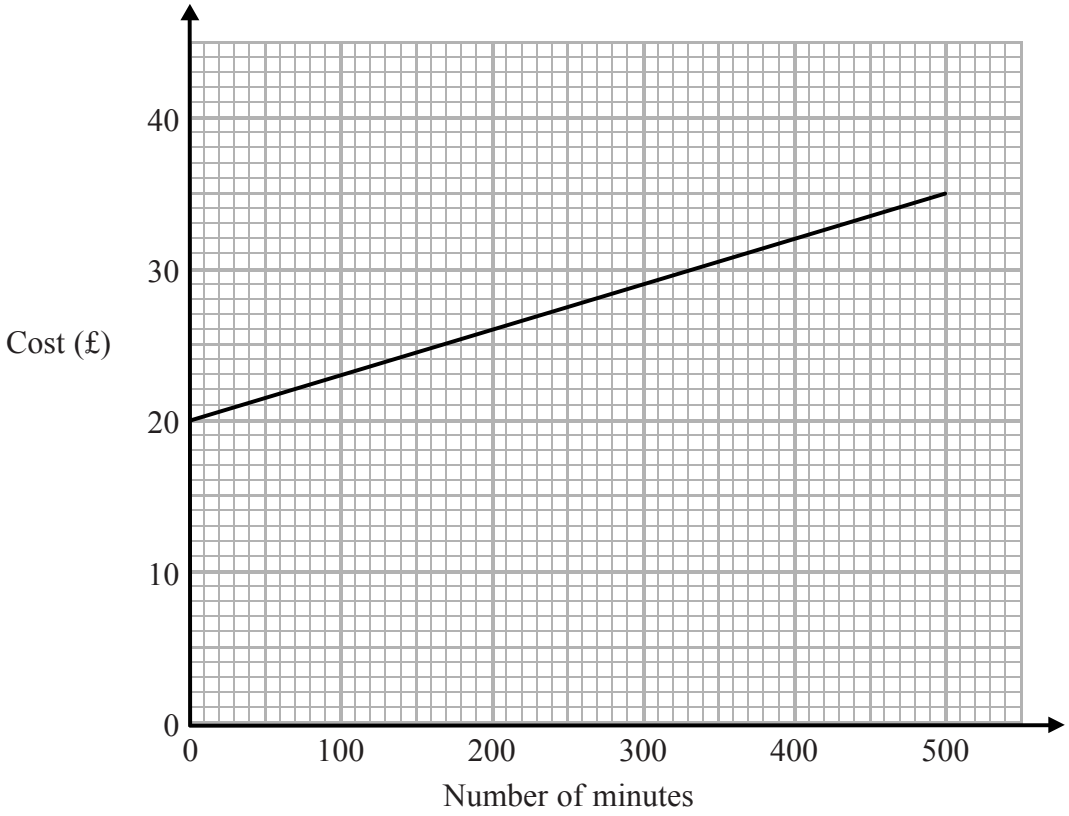
**13** Abi invests £500 for 4 years in a bank account.
The account pays simple interest at a rate of 2.3% per year.

Work out the total amount of interest Abi has got at the end of 4 years.

£.....

**(Total for Question 13 is 3 marks)**

**14** The graph shows the cost of using a mobile phone for one month for different numbers of minutes of calls made.




The cost includes a fixed rental charge of £20 and a charge for each minute of calls made.

Work out the charge for each minute of calls made.

.....

**(Total for Question 14 is 2 marks)**

**15** Here is a list of ingredients for making chocolate mousse for 2 people.

**Chocolate mousse for 2 people**

40 grams sugar
110 grams dark chocolate
2 eggs
$\frac{1}{4}$ teaspoon lemon juice

Ellie has 250 grams of sugar and 550 grams of dark chocolate.
She assumes that she has plenty of lemon juice and plenty of eggs.

(a) What is the greatest number of people Ellie can make chocolate mousse for?
You must justify your answer.

**(3)**

Ellie only has 6 eggs.

(b) What effect would this have on the greatest number of people Ellie can make chocolate mousse for?

.....

.....

**(1)**

**(Total for Question 15 is 4 marks)**

**16** A sprinter runs a distance of 200 metres in 25 seconds.

Work out the average speed of the sprinter.

.....m/s

**(Total for Question 16 is 1 mark)**

**17** (a) Simplify $7x + 2y - 3x + 4y$

.....

**(2)**

(b) Factorise $10x - 15$

.....

**(1)**

(c) Solve $5p = 3p + 8$

$p =$ .....

**(2)**

**(Total for Question 17 is 5 marks)**

**18** There are 64 cards in a pack.
Each card is either red or black.
The ratio of the number of red cards to the number of black cards is 1 : 1

8 red cards are removed from the pack.

Find the ratio of the number of red cards now in the pack to the number of black cards now in the pack.
Give your answer in its simplest form.

.....

**(Total for Question 18 is 3 marks)**

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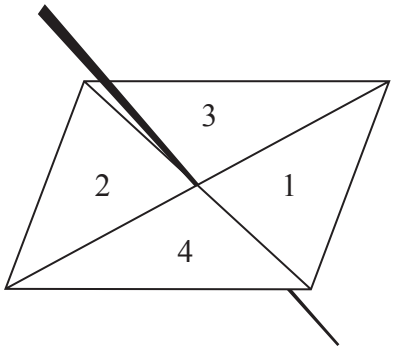
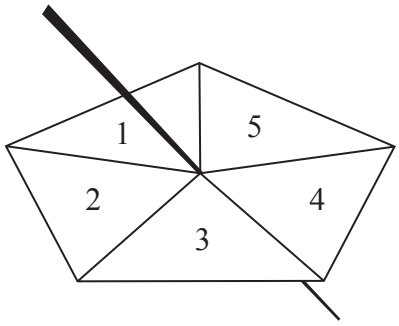
DO NOT WRITE IN THIS AREA

**19** Here are a 4-sided spinner and a 5-sided spinner.

The spinners are fair.




Jeff is going to spin each spinner once.
Each spinner will land on a number.
Jeff will get his score by adding these two numbers together.

(a) Complete the possibility space diagram for each possible score.

**5-sided spinner**

| **4-sided spinner** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 |
| **2** | 3 | | | | |
| **3** | 4 | | | | |
| **4** | 5 | | | | |

**(1)**

Jeff spins each spinner once.

(b) Find the probability that Jeff gets

(i) a score of 3

.....

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DO NOT WRITE IN THIS AREA

(ii) a score of 5 or more.

.....

**(2)**

**(Total for Question 19 is 3 marks)**

**20** Water flows through a pipe at a rate of 20 gallons per minute.

1 gallon = 4.55 litres.

Change 20 gallons per minute to litres per second.
Give your answer correct to 3 significant figures.

..... litres per second

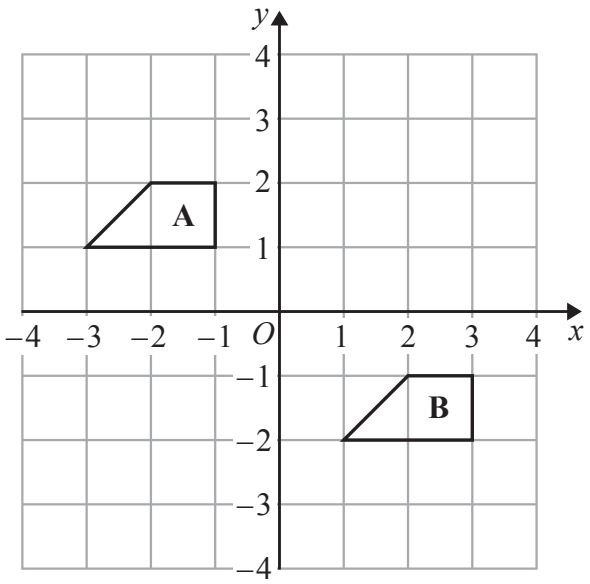
**(Total for Question 20 is 2 marks)**

**21** Find the highest common factor (HCF) of 32, 48 and 72

.....

**(Total for Question 21 is 2 marks)**

**22**



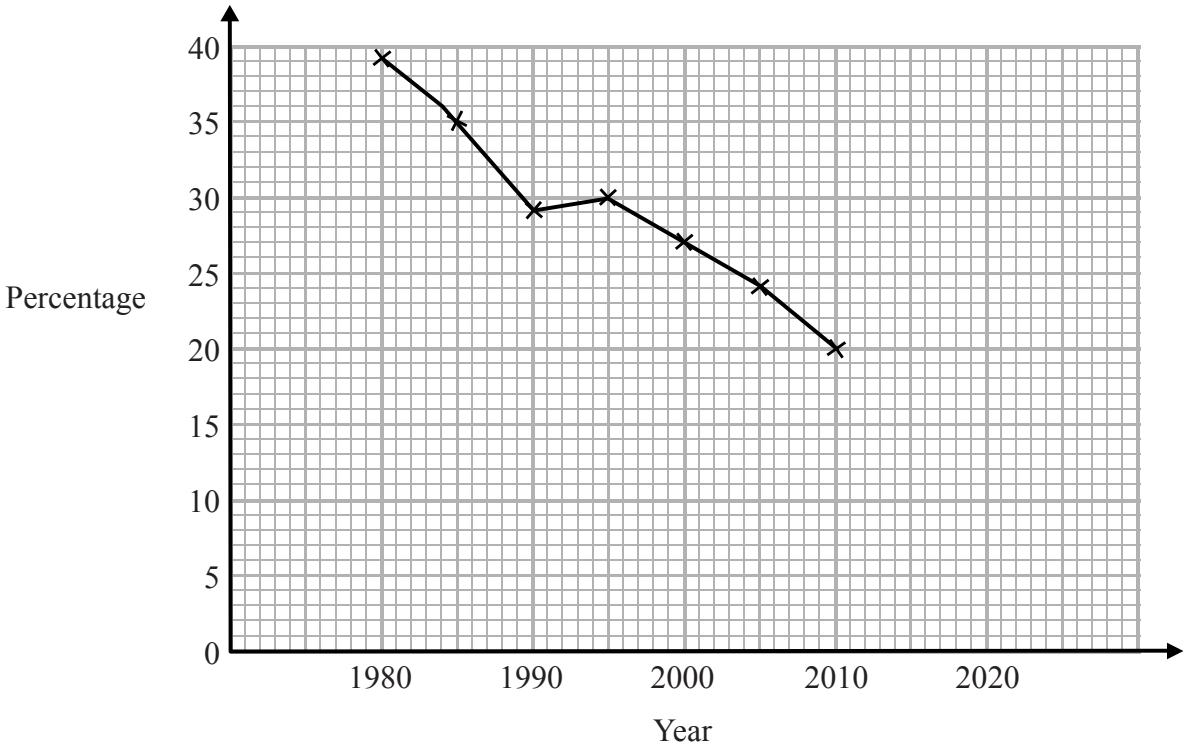

Describe the single transformation that maps shape **A** onto shape **B**.

.....

.....

**(Total for Question 22 is 2 marks)**

**23** The time series graph shows information about the percentages of the people in a village that used the village shop for the years between 1980 and 2010




(a) Describe the trend in the percentage of the people in the village who used the shop for this period.

.....

**(1)**

(b) (i) Use the graph to predict the percentage of the people in the village likely to use the shop in the year 2020

..... %

(ii) Is your prediction reliable?
Explain your answer.

.....

.....

**(3)**

**(Total for Question 23 is 4 marks)**

**24** (a) Expand and simplify $3(y - 2) + 5(2y + 1)$

.....

**(2)**

(b) Simplify $5u^2w^4 \times 7uw^3$

.....

**(2)**

**(Total for Question 24 is 4 marks)**

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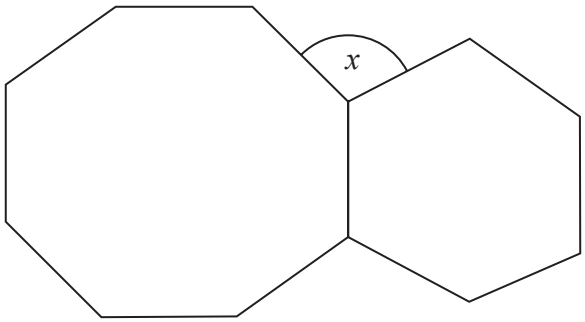
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**25**



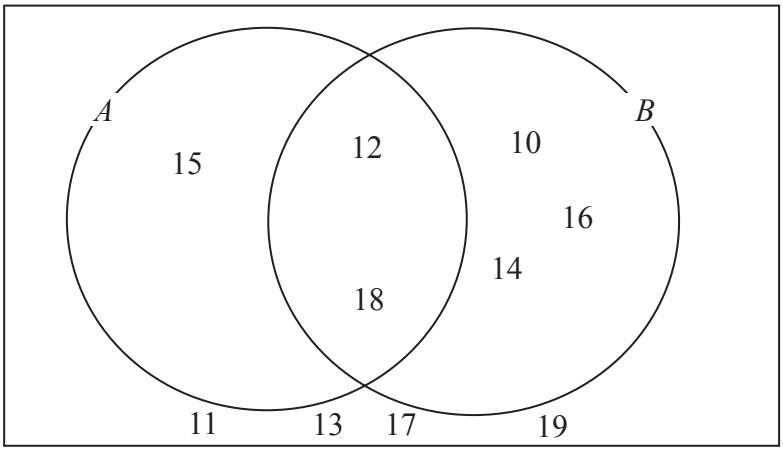

The diagram shows a regular octagon and a regular hexagon.

Find the size of the angle marked $x$
You must show all your working.

$x =$ ..... °

**(Total for Question 25 is 3 marks)**

**26** Here is a Venn diagram.




(a) Write down the numbers that are in set

(i) $A \cup B$

.....

(ii) $A \cap B$

.....

**(2)**

One of the numbers in the diagram is chosen at random.

(b) Find the probability that the number is in set $A'$

.....

**(2)**

**(Total for Question 26 is 4 marks)**

**27** On a farm

the number of cows and the number of sheep are in the ratio 6 : 5
the number of sheep and the number of pigs are in the ratio 2 : 1

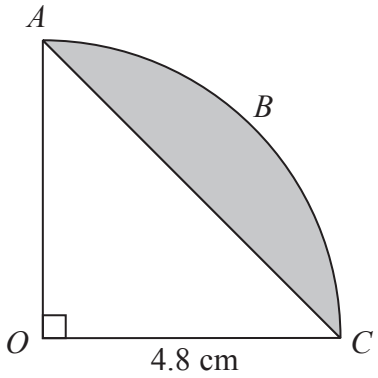
The total number of cows, sheep and pigs on the farm is 189

How many sheep are there on the farm?

.....

**(Total for Question 27 is 3 marks)**

**28**



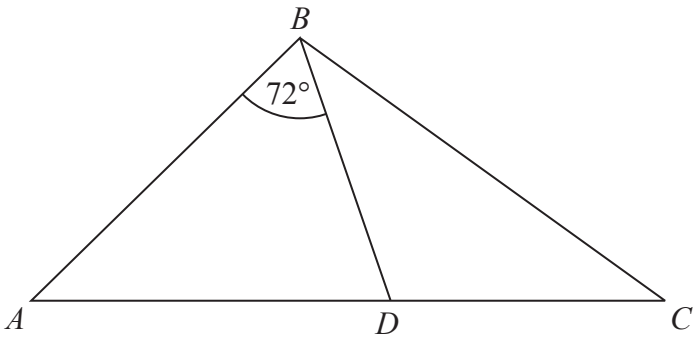

The arc $ABC$ is a quarter of a circle with centre $O$ and radius 4.8 cm.
$AC$ is a chord of the circle.

Work out the area of the shaded segment.
Give your answer correct to 3 significant figures.

.....cm$^2$

**(Total for Question 28 is 3 marks)**

**29**




*ABC* is an isosceles triangle with *BA* = *BC*.

*D* lies on *AC*.
*ABD* is an isosceles triangle with *AB* = *AD*.

Angle *ABD* = 72°

Show that the triangle *BCD* is isosceles.
You must give a reason for each stage of your working.

**(Total for Question 29 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

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| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 1 | | 7000 | B1 cao |
| 2 | | –5°C, –2°C, 3°C, 7°C, 10°C | B1 correct order |
| 3 | | $\frac{3}{40}$ | M1 $\frac{75}{1000}$ oe<br>A1 |
| 4 | | 625 | B1 cao |
| 5 | 720 000 ÷ 3 | 240 000 | P1 for division by 3<br>A1 cao |
| 6 (a) | | 1 hr 4 mins | B1 cao |
| (b) | | No + explanation | B1 for no + explanation, eg the 0717 from Swindon takes less than one hour |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 7 | 2 × £1.10 (= £2.20)<br>3 × £0.95 (= £2.85)<br><br>5 × £2.15 (= £10.75)<br>£2.20 + £2.85 + £10.75<br>£15.80 ÷ 5 | 3.16 | P1 for process of working out total cost of coffees or teas or sandwiches in pence or pounds<br><br>P1 for process of finding total cost using consistent units<br>P1 for process of dividing by 5<br>A1 cao |
| 8 (a) | | Banana | B1 cao |
| (b) | | 20 | B1 cao |
| (c) | | explanation | C2 for full explanation, eg table shows exactly ½ ; pie chart shows less than ½ as angle is less than $180^o$<br>(C1 for partial explanation or reference to just pie chart or just table) |
| 9 | | No + explanation | C1 No, with explanation, eg the angle will still be 25° |
| 10 (a) | | 6.4 – 6.6 | B1 for 6.4 – 6.6 |
| (b) | | 9.8 | B1 for 9.75 – 9.85 |
| (c) | | 5, 9 | B1 cao |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 11 (a) | | rule stated | C1 for rule stated, eg number doubles |
| (b) | | 32 | B1 cao |
| (c) | | 22, 29 | B1 cao |
| 12 | | 0.8 | P1 for process to find amount of soup put in bowls, eg 24 × 0.3 or amount of soup when 8 pints are shared between 24 bowls, eg 24 ÷ 8<br>P1 for complete process to find amount of soup left over<br>A1 |
| 13 | | 46 | M1 for process to find value after 1 year<br>M1 for process to find value after 4 years<br>A1 cao |
| 14 | | 3p | M1 for method to find gradient of line<br>A1 for 3p oe |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 15 (a) | | 10 | P1 for process to find number of people that Ellie can make mousse for using the sugar available<br>P1 for process to find number of people that Ellie can make mousse for using the chocolate available<br>A1 for correct answer with supportive working |
| (b) | | correct explanation | C1 for "can only make mousse for 6 people" oe |
| 16 | | 8 | B1 cao |
| 17 (a) | | $4x + 6y$ | M1 for $4x$ or $6y$<br>A1 for $4x + 6y$ or $2(2x + 3y)$ |
| (b) | | $5(2x - 3)$ | B1 cao |
| (c) | | 4 | M1 for method to isolate terms in $p$ on one side and constants on the other side<br>A1 cao |
| 18 | | 3 : 4 | M1 for $32 - 8$ (= 24)<br>M1 (dep) for "24" : 32<br>A1 cao |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 19 (a) | | Table complete | B1 cao |
| (bi) | | $\frac{1}{10}$ | B1 for $\frac{1}{10}$ oe or ft from table |
| (bii) | | $\frac{7}{10}$ | B1 for $\frac{7}{10}$ oe or ft from table |
| 20 | | 1.52 | M1 for $20 \times 4.55 \div 60$<br>A1 for 1.52 or 1.516(....) |
| 21 | | 8 | M1 for finding the HCF of any two of the three numbers **or** for $2^5$ and $3 \times 2^4$ and $2^3 \times 3^2$<br>A1 cao |
| 22 | | Translation by $\binom{4}{-3}$ | B1 for translation<br>B1 $\binom{4}{-3}$ |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 23 (a) | | Trend described | C1 for "percentage of people who use the shop decreases" oe |
| (bi) | | 13 - 17 | P1 for process to draw trend line on graph<br>A1 for 13 - 17 |
| (bii) | | No + reason | C1 for comment, eg "no, because 2020 is beyond the time period covered by the given data" |
| 24 (a) | | $13y - 1$ | M1 for expansion of one bracket<br>A1 for full simplification |
| (b) | | $35u^3w^7$ | B1 for 2 of 35, $u^3$ and $w^7$ correct<br>B1 cao |
| 25 | | 105 | P1 for process to find the exterior angle or interior angle of a hexagon or octagon<br>P1 for process to find the both exterior angles or both interior angles<br>A1 for 105 from correct working |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 26 (a)(i) | | 10, 12, 14, 15, 16, 18 | B1 cao |
| (ii) | | 12, 18 | B1 cao |
| (b) | | $\frac{7}{10}$ | M1 for 7 or indicating correct region or for 10, 14, 16, 11, 13, 17, 19 listed<br>A1 for $\frac{7}{10}$ oe |
| 27 | 6 : 5 = 12 : 10<br>2 : 1 = 10 : 5<br>C : S : P = 12 : 10 : 5<br>$\frac{10}{27} \times 189$ | 70 | P1 for strategy to start to solve the problem eg 12 : 10 and 10: 5<br>P1 for process to solve the problem eg $\frac{10}{27} \times 189$<br>A1 cao |
| 28 | $\frac{1}{4} \times \pi \times 4.8^2$<br>$\frac{1}{2} \times 4.8 \times 4.8$<br>$\frac{1}{4} \times \pi \times 4.8^2 - \frac{1}{2} \times 4.8 \times 4.8$ | 6.58 | B1 for use of formula for area of a circle<br>P1 for complete process to find area of shaded region<br>A1 for 6.56 – 6.58 |

| Paper 1MA1: 2F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 29 | $\angle ADB = 72°$ (base angles of isosceles triangle $ABD$)<br>$\angle BAD = 180° - 2 \times 72°$ (angle sum of a triangle is 180°)<br>$\angle BCA = 36°$ (base angles of isosceles triangle $ABC$)<br>$\angle BDC = 180° - 72°$ (angles on a straight line sum to 180°)<br>$\angle DBC = 180° - 36° - 108°$ (angle sum of a triangle is 180°) | Result shown | M1 for $\angle ADB = 72°$ and $\angle BAD = 180° - 2 \times 72°$<br>M1 for $\angle BCA =$ "36°"<br>M1 for $\angle BDC = 180° - 72°$<br>C1 for complete chain of reasoning to find angle $DBC = 36°$ and one correct reason<br>C1 C1 dependent on all previous marks for correct deduction and full reasons. |

Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

| Centre Number | Candidate Number |
|---|---|
| | |

# Mathematics

## Paper 3 (Calculator)

**Foundation Tier**

| Specimen Papers Set 2 | Paper Reference |
|---|---|
| **Time: 1 hour 30 minutes** | **1MA1/3F** |

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

## Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

S50159A



S 5 0 1 5 9 A 0 1 2 4

PEARSON

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** Change 4500 g to kg.

..... kg

**(Total for Question 1 is 1 mark)**

**2** Write 0.19 as a fraction.

.....

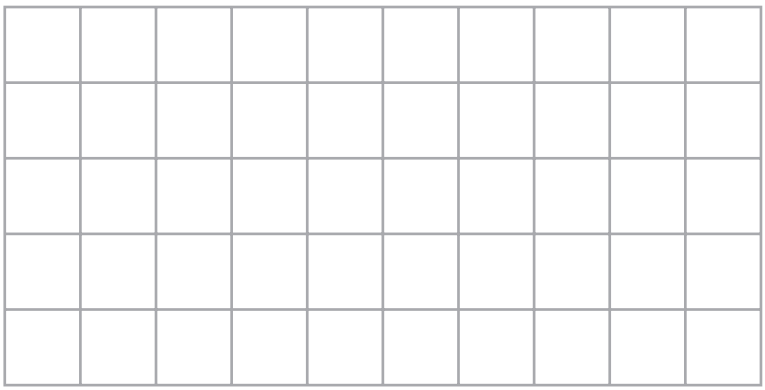
**(Total for Question 2 is 1 mark)**

**3** Write down an even number that is a multiple of 7

.....

**(Total for Question 3 is 1 mark)**

**4** On the grid, draw a parallelogram.



**(Total for Question 4 is 1 mark)**

**5** Write $\frac{3}{5}$ as a percentage.

..... %

**(Total for Question 5 is 1 mark)**

**6** Coffee is sold in jars.
There are 200 g of coffee in each jar.

Ben makes 8 cups of coffee each day.
He thinks he uses 2 g of coffee to make each cup of coffee.

Ben wants to buy enough coffee for 28 days.

(a) How many jars of coffee does Ben need to buy?

.....

**(3)**

Ben finds that he uses 2.5 g of coffee to make each cup of coffee.

(b) How does this affect the number of jars of coffee he needs to buy?
You must give a reason for your answer.

.....

.....

**(2)**

**(Total for Question 6 is 5 marks)**

**7** Write down three different factors of 18 that add together to give a prime number.

..... ..... .....

**(Total for Question 7 is 2 marks)**

**8** A model plane has a length of 17 cm.

The scale of the model is 1 : 200

Work out the length of the real plane.
Give your answer in metres.

..... metres

**(Total for Question 8 is 2 marks)**

**9** (a) Find the value of $\sqrt[3]{97.336}$

.....

**(1)**

(b) Find the value of $\sqrt{7.29} + (2.3 - 0.85)^2$

.....

**(2)**

**(Total for Question 9 is 3 marks)**

**10** The stem and leaf diagram gives information about the speeds of 27 cars.

| | |
|---|---|
| 3 | 8 |
| 4 | 1 3 4 6 7 8 8 9 9 |
| 5 | 2 2 4 6 7 7 8 8 9 |
| 6 | 1 1 2 2 2 2 3 |
| 7 | 0 |

Key:
3 | 8 means 38 miles per hour

(a) Find the median speed.

..... miles per hour
**(1)**

(b) Work out the range.

..... miles per hour
**(1)**

One of the cars is chosen at random.

Jack says,

"The probability that the speed of this car is more than 60 miles per hour is $\frac{1}{3}$"

(c) Jack is wrong.
Explain why.

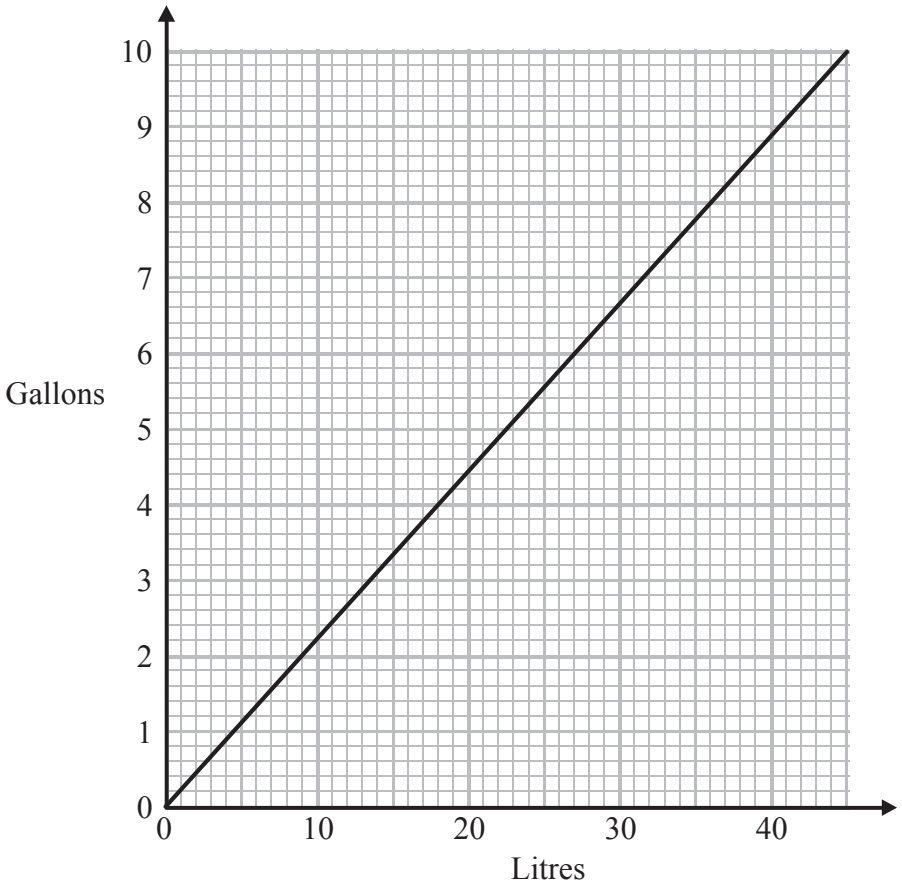
.....

.....

**(2)**

**(Total for Question 10 is 4 marks)**

**11** You can use this graph to change between litres and gallons.




Which is the greater, 60 litres or 12 gallons?
You must show how you get your answer.

.....

**(Total for Question 11 is 2 marks)**

**12** Ibrar buys 3 kg of apples.
He also buys 0.4 kg of mushrooms.
The total cost is £6.93

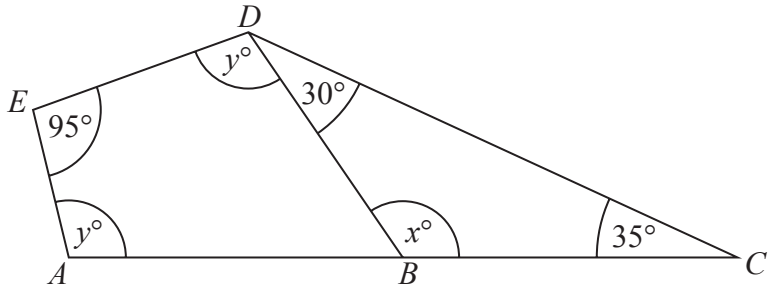
1 kg of apples cost £1.95

Work out the cost of 1 kg of mushrooms.

£ .....

**(Total for Question 12 is 3 marks)**

**13**




*ABC* is a straight line.
*BCD* is a triangle.
*ABDE* is a quadrilateral.

(a) (i) Work out the value of $x$.

.....

(ii) Give a reason for your answer.

.....

.....

**(2)**

(b) Work out the value of $y$.

.....

**(2)**

**(Total for Question 13 is 4 marks)**

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**14** You can use this rule to work out the total cost, in pounds, of hiring a carpet cleaner.

| Multiply the number of days by 7.8 and then add 12 |
|---|

Andy hires a carpet cleaner.
The total cost is £82.20

(a) Work out the number of days Andy hires the carpet cleaner for.

.....days
**(2)**

Chloe hires a carpet cleaner for $y$ days.
The total cost is £$T$.

(b) Write down a formula for $T$ in terms of $y$.

.....
**(2)**

**(Total for Question 14 is 4 marks)**

**15** There are 35 pens in a box.
15 of the pens are green.
The rest of the pens are red.

(a) What fraction of the pens in the box are red?

.....

**(1)**

(b) Write down the ratio of the number of green pens to the number of red pens.
Give your ratio in its simplest form.

.....

**(2)**

**(Total for Question 15 is 3 marks)**

**16** Ross rolled an ordinary dice 30 times.

The frequency table gives information about his results.

| Score | Frequency |
|---|---|
| 1 | 7 |
| 2 | 5 |
| 3 | 4 |
| 4 | 4 |
| 5 | 6 |
| 6 | 4 |

Ross worked out the mean score as 8

(a) Explain why it is impossible for the mean score to be 8

.....

.....

**(1)**

Graham also worked out the mean score.

Here is his working.

$1 \times 7 + 2 \times 5 + 3 \times 4 + 4 \times 4 + 5 \times 6 + 6 \times 4 = 99$

$99 \div 6 = 16.5$

The mean score is 16.5

(b) Describe the mistake Graham made in his method to work out the mean score.

.....

.....

**(1)**

**(Total for Question 16 is 2 marks)**

**17** Amelia, Hayden and Sophie did a test.
The total for the test was 75 marks.

Amelia got 56% of the 75 marks.

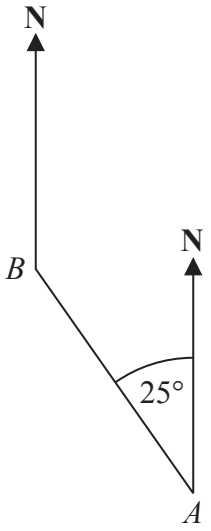
Hayden got $\frac{8}{15}$ of the 75 marks.

Sophie got 43 out of 75

Who got the highest mark?
You must show all your working.

**(Total for Question 17 is 3 marks)**

**18** The diagram shows the positions of two churches, $A$ and $B$.




Amber says,

"The bearing of church $B$ from church $A$ is 025°"

Amber is wrong.
Explain why.

.....

.....

**(Total for Question 18 is 1 mark)**

**19** There are only blue counters, green counters, red counters and yellow counters in a bag. George is going to take at random a counter from the bag.

The table shows each of the probabilities that George will take a blue counter or a green counter or a yellow counter.

| **Colour** | blue | green | red | yellow |
|---|---|---|---|---|
| **Probability** | 0.5 | 0.2 | | 0.25 |

(a) Work out the probability that George will take a red counter.

.....

**(1)**

There are 120 counters in the bag.

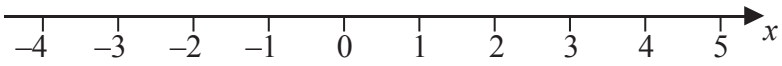
(b) Work out the number of green counters in the bag.

.....

**(2)**

**(Total for Question 19 is 3 marks)**

**20** (a) Show the inequality $-2 \leqslant x < 3$ on the number line below.




**(2)**

(b) Solve the inequality $4y + 7 < 16$

.....

**(2)**

**(Total for Question 20 is 4 marks)**

**21** Here are the first five terms of an arithmetic sequence.

$$-3 \quad 1 \quad 5 \quad 9 \quad 13$$

Find an expression, in terms of $n$, for the $n$th term of this sequence.

.....

**(Total for Question 21 is 2 marks)**

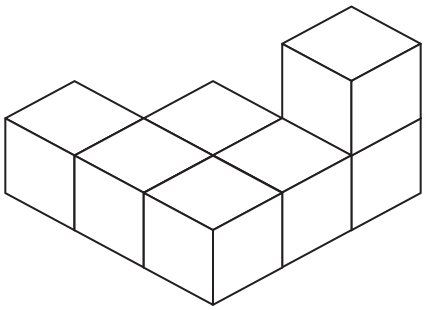
**22** The ratio of the number of boys to the number of girls in a school is 4 : 5
There are 95 girls in the school.

Work out the total number of students in the school.

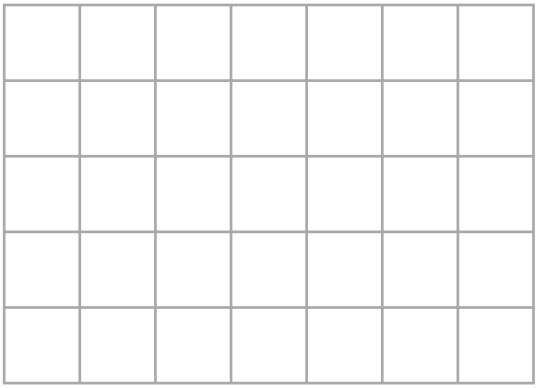
.....

**(Total for Question 22 is 3 marks)**

**23** The diagram represents a solid made from seven centimetre cubes.



On the centimetre grid below, draw a plan of the solid.



**(Total for Question 23 is 2 marks)**

**24** Make $t$ the subject of the formula $y = \frac{t}{3} - 2a$

**(Total for Question 24 is 2 marks)**

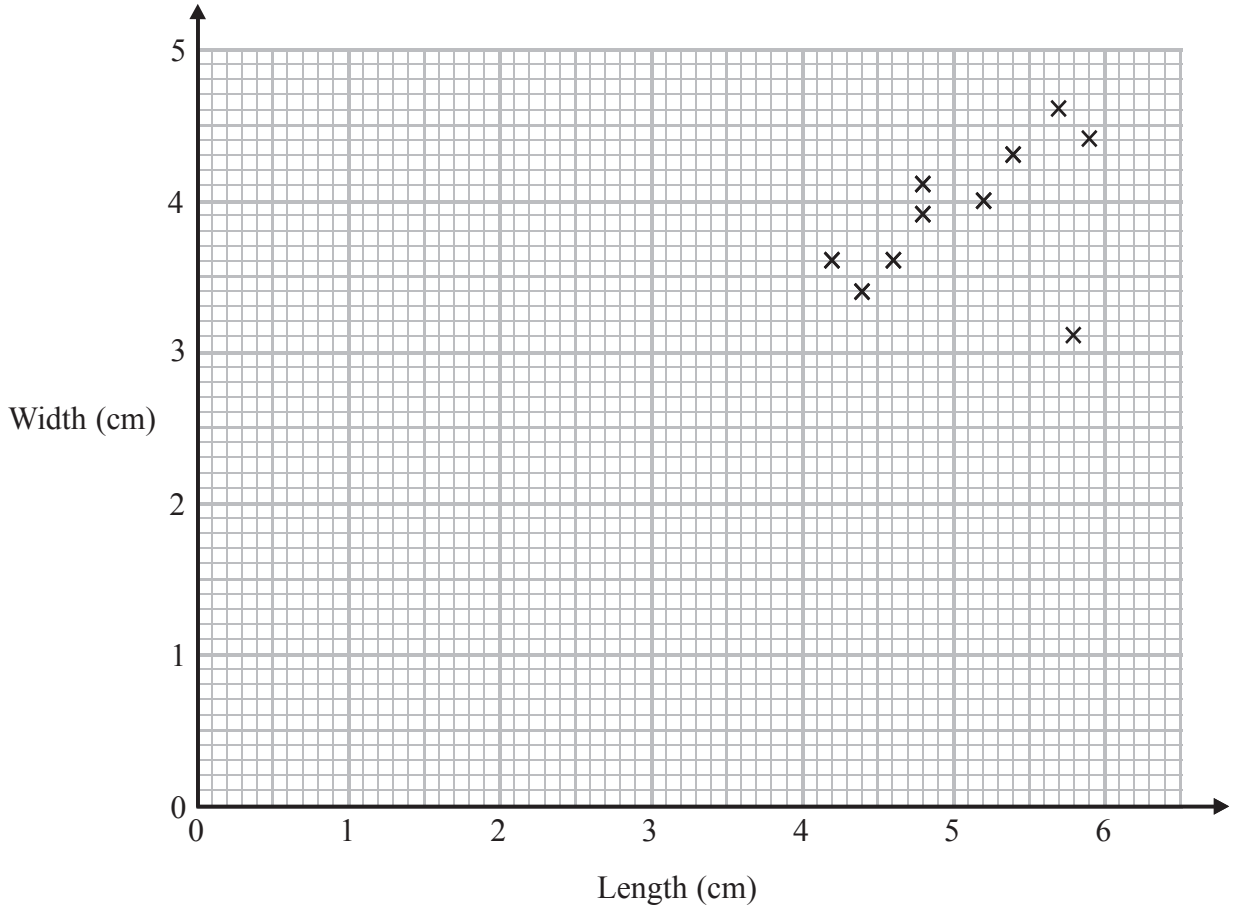
**25** Jim rounds a number, $x$, to one decimal place.
The result is 7.2

Write down the error interval for $x$.

**(Total for Question 25 is 2 marks)**

**26** Katie measured the length and the width of each of 10 pine cones from the same tree.

She used her results to draw this scatter graph.




(a) Describe one improvement Katie can make to her scatter graph.

.....

.....

**(1)**

The point representing the results for one of the pine cones is an outlier.

(b) Explain how the results for this pine cone differ from the results for the other pine cones.

.....

.....

**(1)**

**(Total for Question 26 is 2 marks)**

**27** At a depth of $x$ metres, the temperature of the water in an ocean is $T$°C.
At depths below 900 metres, $T$ is inversely proportional to $x$.

$T$ is given by

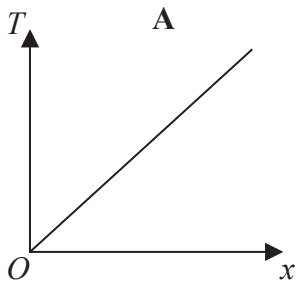
$$T = \frac{4500}{x}$$

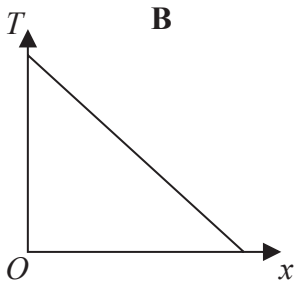
(a) Work out the difference in the temperature of the water at a depth of 1200 metres and the temperature of the water at a depth of 2500 metres.

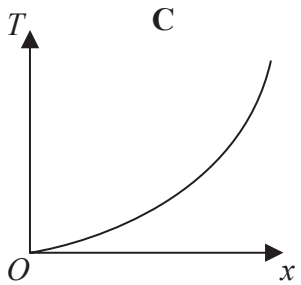
.....°C

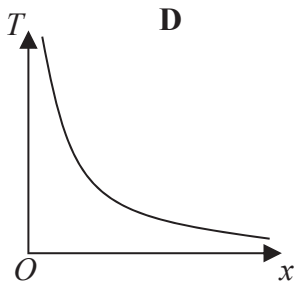
**(3)**

Here are four graphs.




One of the graphs could show that $T$ is inversely proportional to $x$.

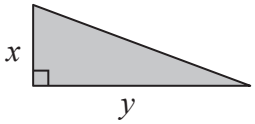
(b) Write down the letter of this graph.

.....

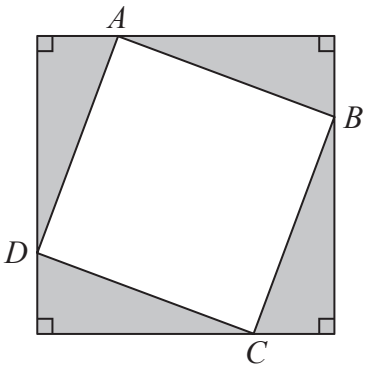
**(1)**

**(Total for Question 27 is 4 marks)**

**28** Here is a right-angled triangle.



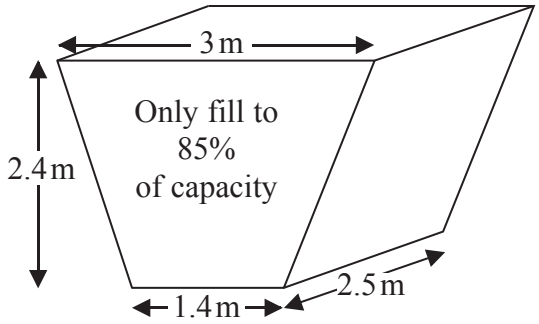

Four of these triangles are joined to enclose the square *ABCD* as shown below.




Show that the area of the square *ABCD* is $x^2 + y^2$

**(Total for Question 28 is 3 marks)**

**29** The diagram shows an oil tank in the shape of a prism.
The cross section of the prism is a trapezium.




The tank is empty.

Oil flows into the tank.
After one minute there are 300 litres of oil in the tank.

Assume that oil continues to flow into the tank at this rate.

(a) Work out how many **more** minutes it takes for the tank to be 85% full of oil.
($1\,m^3 = 1000$ litres)

..... minutes
**(5)**

The assumption about the rate of flow of the oil could be wrong.

(b) Explain how this could affect your answer to part (a).

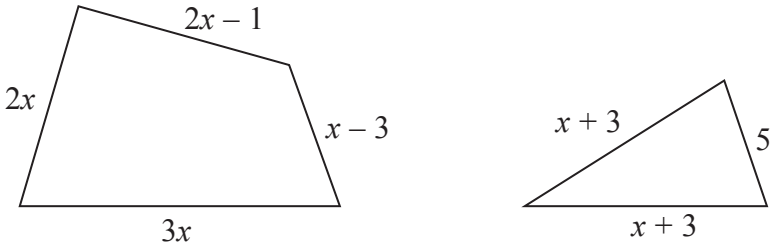
.....

.....

**(1)**

**(Total for Question 29 is 6 marks)**

**30**




In the diagram all measurements are in centimetres.

The perimeter of the quadrilateral is twice the perimeter of the triangle.

Work out the perimeter of the quadrilateral.

..... cm

**(Total for Question 30 is 4 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

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| Paper 1MA1: 3F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 1 | | 4.5 | B1 cao |
| 2 | | $\frac{19}{100}$ | B1 cao |
| 3 | | even mult of 7 | B1 for an even multiple of 7 |
| 4 | | parallelogram | B1 for parallelogram drawn |
| 5 | | 60 | B1 cao |
| 6 (a) | | 3 | P1 start of process eg 8×2×28 (= 448)<br>P1 eg '448' ÷ 200 (= 2.24) or build up method<br>A1 cao |
| (b) | | No change with reason | P1 process to evaluate effect of 2.5g<br>C1 explanation that number of jars is unchanged |
| 7 | | 1,3,9 or 2,6,9 or 2,3,6 or 2,3,18 or 2,9,18 | M1 3 factors of 18 or 3 numbers with prime total<br>A1 eg 2, 3, 6 |
| 8 | | 34 | M1 for first step in process eg 17×200 (= 3400)<br>A1 cao |

| Paper 1MA1: 3F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 9 (a) | | 4.6 | B1 cao |
| (b) | | 4.8025 | B1 for 2.7 or 2.1025 (implied by answer of 4.8025)<br>B1 cao |
| 10 (a) | | 56 | B1 cao |
| (b) | | 32 | B1 cao |
| (c) | | Reason | C1 starts argument eg 8 cars or 8/27<br>C1 completes argument eg with 1/3 = 9/27 |
| 11 | | 60 litres with evidence | M1 reads from graph, eg 30*l* = 6.6 gals or 6 gals = 27*l*<br>C1 60 litres with sufficient evidence |
| 12 | | 2.70 | P1 start of process 1.95×3 (= 5.85)<br>P1 complete process eg (6.93 – '5.85') ÷ 0.4<br>A1 cao |
| 13 (a) i | | 115 | B1 cao |
| ii | | | C1 angles in a triangle add to 180 |
| (b) | | 100 | P1 complete process to find *y* ft from (a)<br>A1 for 100 or ft from (a) |

| Paper 1MA1: 3F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 14 (a) | | 9 | M1 for – 12 and ÷ 7.80<br>A1 cao |
| (b) | | $T = 7.8y + 12$ | C1 for $7.8y + 12$ or $T$ = linear expression in $y$<br>C1 $T = 7.8y + 12$ oe |
| 15 (a) | | $\frac{20}{35}$ | B1 $\frac{20}{35}$ oe |
| (b) | | 3 : 4 | M1 15 : 20<br>A1 cao |
| 16 (a) | | No and reason | C1 No and reason eg the mean must be less than 6 |
| (b) | | explanation | C1 Should have divided by 30, not by 6 |
| 17 | | Sophie and correct values | P1 process leading to two comparable values eg 75÷15×8 (= 40) or 56÷100×75 (=42) oe<br>P1 complete process leading to 3 comparable values<br>C1 correct deduction with correct comparable values |
| 18 | | explanation | C1 'The bearing is 335°' or 'She should have measured clockwise from north' oe |
| 19 (a) | | 0.05 | B1 cao |
| (b) | | 24 | M1 for 120 × 0.2 oe<br>A1 cao |

| Paper 1MA1: 3F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 20 (a) | | diagram | C1 line drawn from –2 to 3<br>C1 cao |
| (b) | | $y < 2.25$ | M1 for clear intention to subtract 7 from both sides of inequality or equation or divide all terms of inequality or equation by 4 or $4y < 9$ or 2.25 oe<br>A1 $y < 2.25$ oe as final answer |
| 21 | | $4n - 7$ | M1 method to deduce $n$th term e.g. $4n + k$<br>A1 for $4n - 7$ oe |
| 22 | | 171 | P1 for process to find one share<br>P1 for process to find total<br>A1 cao |
| 23 | | plan | C1 a partially correct plan<br>C1 correct plan |
| 24 | | $t = 3(y + 2a)$ | M1 adding $2a$ to both sides or multiplying each term by 3<br>A1 $t = 3(y + 2a)$ or $t = 3y + 6a$ |
| 25 | | $7.15 \leq x < 7.25$ | B1 for 7.15 and 7.25<br>B1 cao |

| Paper 1MA1: 3F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 26 (a) | | improvement | C1 appropriate improvement eg do not have axes starting at (0, 0) |
| (b) | | explanation | C1 explanation eg pine cone has a very short width for its length |
| 27 (a) | | 1.95 | M1 method to find one temperature eg 4500 ÷ 1200<br>M1 for complete method<br>A1 cao |
| (b) | | D | B1 cao |
| 28 | | complete chain of reasoning | C1 starts chain of reasoning eg finds area of large square and area of triangle or use of Pythagoras<br>C1 for $(x + y)^2 - 4\times (x\times y\div 2)$ oe or $\sqrt{x^2 + y^2} \times \sqrt{x^2 + y^2}$<br>C1 complete chain of reasoning with correct algebra |

| Paper 1MA1: 3F | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 29 (a) | | 36.4 | P1 start process eg method to find area of trapezium<br>P1 complete process to find volume of tank<br>P1 process to find time eg volume × 1000 ÷ 300<br>P1 process to find 85% of volume or of time<br>A1 for 36.4 or 36 mins 24 secs |
| (b) | | | C1 explanation eg if the average rate was slower it would take more time, if the average rate was faster it would take less time |
| 30 | | 48 | P1 process to start solving problem, eg forms an appropriate equation<br>P1 complete process to isolate terms in $x$<br>A1 for $x = 6.5$ oe<br>B1 ft (dep P1) for correct perimeter for their $x$ |

Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

| Centre Number | Candidate Number |
|---|---|
| | |

# Mathematics

## Paper 1 (Non-Calculator)

**Higher Tier**

| Specimen Papers Set 2 | Paper Reference |
|---|---|
| **Time: 1 hour 30 minutes** | **1MA1/1H** |

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

## Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may not be used.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out**.

## Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

## Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

S50156A



S 5 0 1 5 6 A 0 1 1 6

PEARSON

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1** (a) Factorise $y^2 + 27y$

.....

**(1)**

(b) Simplify $(t^3)^2$

.....

**(1)**

(c) Simplify $\frac{w^9}{w^4}$

.....

**(1)**

**(Total for Question 1 is 3 marks)**

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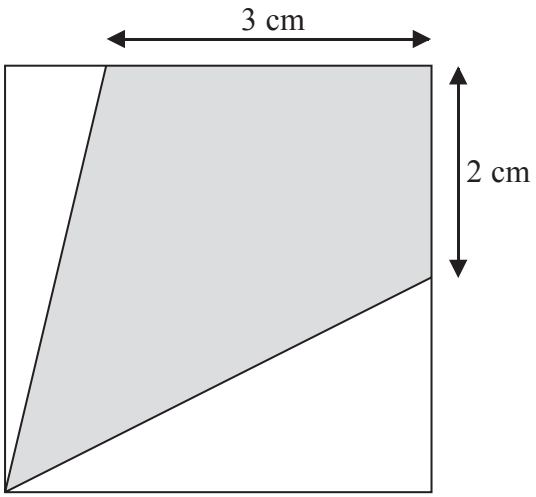
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**2** The diagram shows a square with perimeter 16 cm.



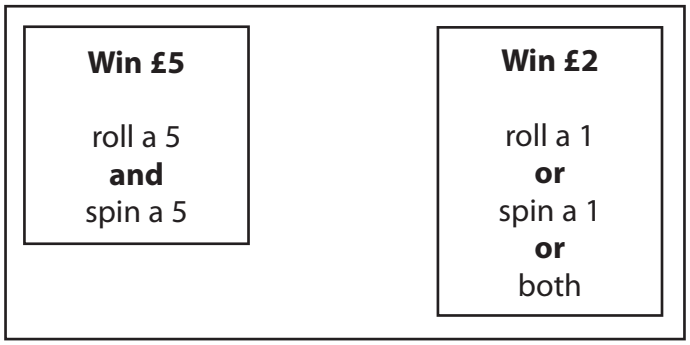

Work out the proportion of the area inside the square that is shaded.

.....

**(Total for Question 2 is 5 marks)**

**3** David has designed a game.
He uses a fair 6-sided dice and a fair 5-sided spinner.
The dice is numbered 1 to 6
The spinner is numbered 1 to 5

Each player rolls the dice once and spins the spinner once.
A player can win £5 or win £2




David expects 30 people will play his game.
Each person will pay David £1 to play the game.

(a) Work out how much profit David can expect to make.

£.....

**(4)**

(b) Give a reason why David's actual profit may be different to the profit he expects to make.

.....

.....

**(1)**

**(Total for Question 3 is 5 marks)**

**4** Triangle $ABC$ has perimeter 20 cm.

$AB = 7$ cm.
$BC = 4$ cm.

By calculation, deduce whether triangle $ABC$ is a right-angled triangle.

**(Total for Question 4 is 4 marks)**

**5** One sheet of A3 card has area $\frac{1}{8}$ m$^2$.

The card has a mass of 160 g per m$^2$.

Work out the total mass of 25 sheets of A3 card.

**(Total for Question 5 is 4 marks)**

**6** (a) Work out $2\frac{1}{4} \times 3\frac{1}{3}$

Give your answer as a mixed number in its simplest form.

**(3)**

(b) Write the numbers 3, 4, 5 and 6 in the boxes to give the greatest possible total.
You may write each number only once.

$$\square\frac{1}{\square} + \square\frac{2}{\square}$$

**(1)**

**(Total for Question 6 is 4 marks)**

**7** A shop has a sale.

| Microwave ovens | Combination ovens |
| --- | --- |
| $\frac{1}{3}$ off normal price | 40% off normal price |

A microwave oven has a sale price of £90
A combination oven has a sale price of £84

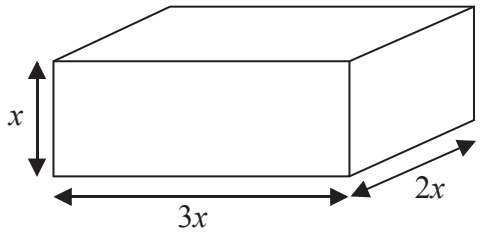
Which of these ovens has the greater normal price?
You must show all your working.

**(Total for Question 7 is 4 marks)**

**8** Work out an estimate for $\sqrt{4.98 + 2.16 \times 7.35}$

**(Total for Question 8 is 3 marks)**

**9** Here is a cuboid.




All measurements are in centimetres.
$x$ is an integer.
The total volume of the cuboid is less than 900 $cm^3$

Show that $x \leqslant 5$

**(Total for Question 9 is 3 marks)**

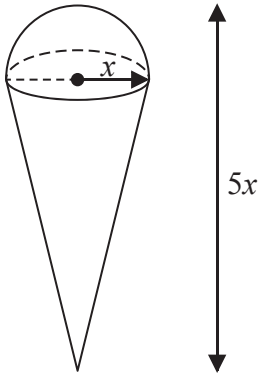
**10** $y$ is inversely proportional to $x$
When $x = 1.5$, $y = 36$

Find the value of $y$ when $x = 6$

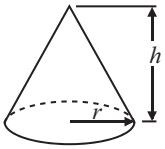
.....

**(Total for Question 10 is 3 marks)**

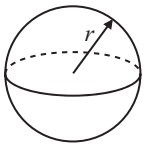
**11** A solid is made by putting a hemisphere on top of a cone.



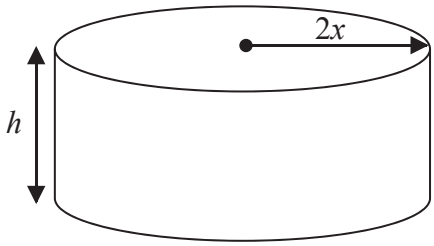

**Volume of cone** = $\frac{1}{3}\pi r^2 h$




**Volume of sphere** = $\frac{4}{3}\pi r^3$




The total height of the solid is $5x$
The radius of the base of the cone is $x$
The radius of the hemisphere is $x$



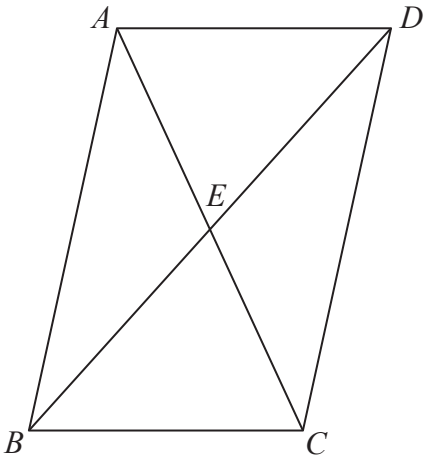

A cylinder has the same volume as the solid.
The cylinder has radius $2x$ and height $h$
All measurements are in centimetres.

Find a formula for $h$ in terms of $x$
Give your answer in its simplest form.

.....

**(Total for Question 11 is 5 marks)**

**12** *ABCD* is a parallelogram.




*E* is the point where the diagonals *AC* and *BD* meet.

Prove that triangle *ABE* is congruent to triangle *CDE*.

**(Total for Question 12 is 3 marks)**

**13** Mr Brown gives his class a test.
The 10 girls in the class get a mean mark of 70%
The 15 boys in the class get a mean mark of 80%

Nick says that because the mean of 70 and 80 is 75 then the mean mark for the whole class in the test is 75%

Nick is not correct.
Is the correct mean mark less than or greater than 75%?
You must justify your answer.

**(Total for Question 13 is 2 marks)**

**14** Show that $\frac{\left(4-\sqrt{3}\right)\left(4+\sqrt{3}\right)}{\sqrt{13}}$ simplifies to $\sqrt{13}$

**(Total for Question 14 is 2 marks)**

**15** (a) Find the value of $\sqrt[3]{8 \times 10^6}$

.....

**(1)**

(b) Find the value of $144^{\frac{1}{2}} \times 64^{-\frac{1}{3}}$

.....

**(2)**

(c) Solve $3^{2x} = \frac{1}{81}$

$x =$ .....

**(2)**

**(Total for Question 15 is 5 marks)**

---

**16** The probability that Sanay is late for school tomorrow is 0.05
The probability that Jaden is late for school tomorrow is 0.15

Alfie says that the probability that Sanay and Jaden will both be late for school tomorrow is 0.0075 because $0.05 \times 0.15 = 0.0075$

What assumption has Alfie made?

.....

.....

**(Total for Question 16 is 1 mark)**

---

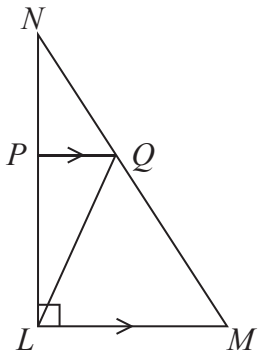
**17** Solve $x^2 - 6x - 8 = 0$

Write your answer in the form $a \pm \sqrt{b}$ where $a$ and $b$ are integers.

.....

**(Total for Question 17 is 3 marks)**

**18** LMN is a right-angled triangle.




Angle $NLM = 90°$
$PQ$ is parallel to $LM$.

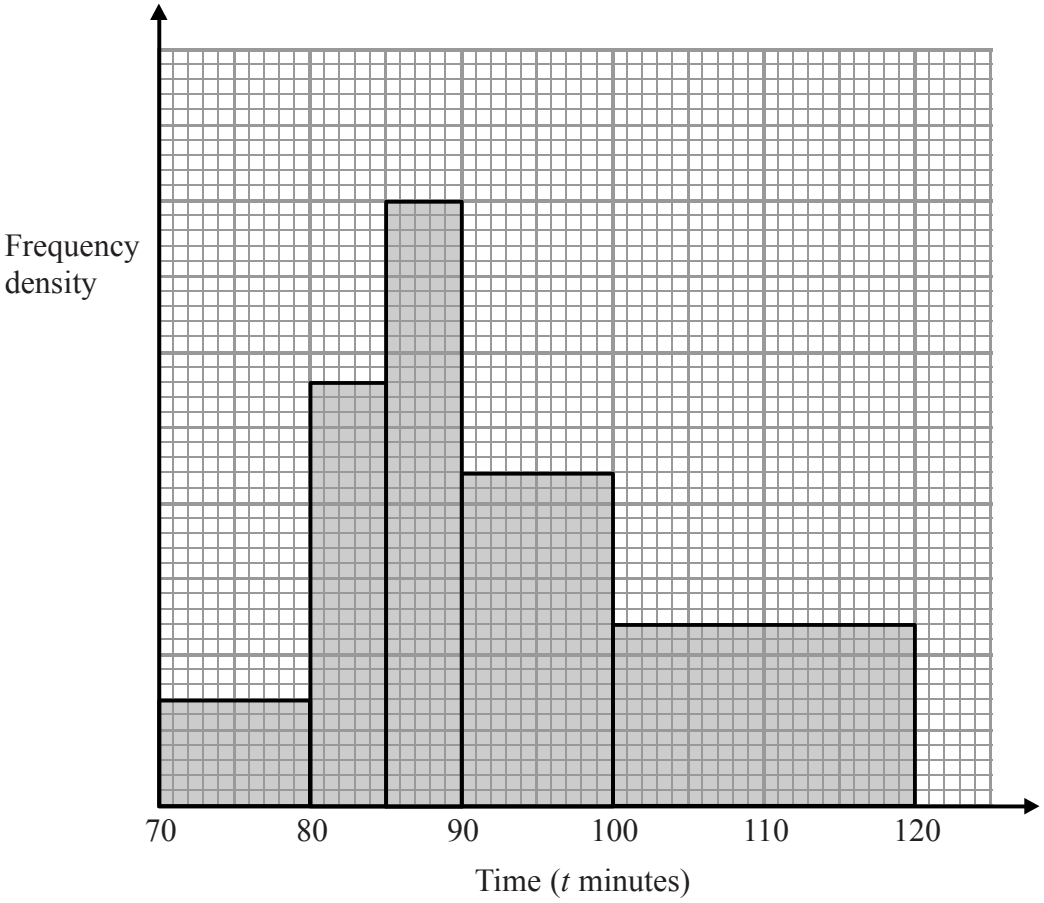
The area of triangle $PNQ$ is 8 cm$^2$
The area of triangle $LPQ$ is 16 cm$^2$

Work out the area of triangle $LQM$.

..... cm$^2$

**(Total for Question 18 is 4 marks)**

**19** The histogram shows information about the time taken by cyclists to finish a cycle race.




7 cyclists took 80 minutes or less to finish the race.

(i) Work out an estimate for the number of cyclists who took more than 105 minutes to finish the race.

.....

(ii) Explain why your answer to part (i) is only an estimate.

.....

.....

**(Total for Question 19 is 4 marks)**

**20** Show that $\frac{3x + 6}{x^2 - 3x - 10} \div \frac{x + 5}{x^3 - 25x}$ simplifies to a$x$ where a is an integer.

**(Total for Question 20 is 4 marks)**

**21** Solve the inequality $x^2 > 3(x + 6)$

**(Total for Question 21 is 4 marks)**

**22** The line $l$ is a tangent to the circle $x^2 + y^2 = 40$ at the point $A$.
$A$ is the point (2, 6).

The line $l$ crosses the $x$-axis at the point $P$.

Work out the area of triangle $OAP$.

**(Total for Question 22 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

| Paper 1MA1: 1H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 1 a | | $y\,(y + 27)$ | B1 |
| b | | $t^6$ | B1 |
| c | | $w^5$ | B1 |
| 2 | $16 \div 4$<br>$\frac{1\times4}{2}=2$ or $\frac{1}{2}\times\frac{1}{4}=\frac{1}{8}$<br>$\frac{2\times4}{2}=4$ or $\frac{1}{2}\times\frac{1}{2}=\frac{1}{4}$<br>$\frac{1\times4}{2}+\frac{2\times4}{2}=6$ or $\frac{1}{2}\times\frac{1}{4}+\frac{1}{2}\times\frac{1}{2}=\frac{3}{8}$<br>$16 - 6 = 10$ or $1-\frac{3}{8}=\frac{5}{8}$ | $\frac{5}{8}$ | P1 Using side lengths of 4<br>P1 Method to find fraction or area for one unshaded triangle<br>P1 Method to complete fraction or area for total unshaded region<br>P1 Method to find total fraction or area for shaded region<br>A1 for $\frac{5}{8}$ oe or 0.625 |

| Paper 1MA1: 1H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 3 a | $\frac{1}{6}\times\frac{1}{5}\times 30\times 5 = 5$<br>$(\frac{5}{6}\times\frac{1}{5}+\frac{1}{6}\times\frac{4}{5}+\frac{1}{6}\times\frac{1}{5})\times 30\times 2$<br>$30 - 5 - 20$ | 5 | P1 for identifying correct process to find probabilities for winnng scores. May include use of tree diagram or sample space<br>P1 for correct process to find prize money<br>P1 for completing correct process to find profit<br>A1 |
| b | | Explanation | C1 for appropriate comment to interpret result eg probability so only likelihood not certainty, other than 30 may play, £5 is small difference. |
| 4 | | No with reasoning | M1 Derive $AC$=9 cm and identify as hypotenuse<br>M1 $4^2 + 7^2$<br>A1 for using eg $AC = \sqrt{4^2 + 7^2}$ or 65 and 81<br>C1 for concluding explanation that $ABC$ is not a right-angled triangle with evidence. |
| 5 | | 500g | P1 $\frac{1}{8}\times 160$ (=20)<br>P1 '20' × 25<br>A1 500 (or 0.5)<br>B1 Correct units g (or kg) |

| Paper 1MA1: 1H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 6 a | | $7\frac{1}{2}$ | M1 $\frac{9}{4}\times\frac{10}{3}$ oe<br>M1 $\frac{90}{12}$ oe<br>A1 $7\frac{1}{2}$ |
| b | | $5\frac{1}{4}+6\frac{2}{3}$ or $5\frac{2}{3}+6\frac{1}{4}$ | B1 $5\frac{1}{4}+6\frac{2}{3}$ or $5\frac{2}{3}+6\frac{1}{4}$ |
| 7 | $\frac{90}{2}\times 3=135$<br>$\frac{84}{60}\times 100=140$ | Combination with reason | P1 Links either $\frac{2}{3}$ with 90 and 60% with 84<br>P1 Process to find original price of microwave oven eg $\frac{90}{2}\times 3$ (=135)<br>P1 Process to find original price of combination oven eg $\frac{84}{60}\times 100$ (=140)<br>A1 Correct original prices £135 and £140 with interpretation of results to conclude that combination oven had greater normal price. |
| 8 | | 4 - 4.5 | B1 Rounds appropriately using two of 5, 2 or 7<br>M1 $\sqrt{19}$<br>A1 4 - 4.5 |

| Paper 1MA1: 1H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 9 | $x \times 2x \times 3x =$ | Reasoning to reach $x \leq 5$ | M1 Starts reasoning to find volume in terms of x<br>M1 Gives inequality $6x^3 \leq 900$ or substitutes 5 and 6 into $6x^3$<br>M1 Completes reasoning to show $x \leq 5$ |
| 10 | | 9 | M1 Finds constant $36 \times 1.5$ (=54) or $\frac{6}{1.5}=4$<br>M1 $54 \div 6$ or $36 \div 4$<br>A1 9 cao |
| 11 | $\frac{4}{3\times2}\pi x^3+\frac{4}{3}\pi x^3=2\pi x^3$<br>$(2x)^2 \pi h = 4x^2 \pi h$<br>$4x^2 \pi h = 2\pi x^3$ | $h=\frac{x}{2}$ | P1 Process to find volume of cone or hemisphere<br>P1 Process to total volume of solid<br>P1 Process to find volume of cylinder<br>P1 Equates 2 volumes<br>A1 Reaches $h=\frac{x}{2}$ |
| 12 | | Complete proof | M1 Begins proof *BAE=ACD* and *ABE=EDC*<br>M1 *AB = DC* because opposite sides of a parallelogram are equal<br>C1 Completes proof with all reasons eg alternate angles are equal and reference to ASA |

| Paper 1MA1: 1H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 13 | | more than | C1 Makes reference to different numbers of girls and boys<br>C1 Completes reasoning eg there are more (boys) with 80% than (girls) with 70% or correct mean (700+1200)÷25 = 76 |
| 14 | | Completes reasoning | M1 Expansion of $(4-\sqrt{3})(4+\sqrt{3})$ with at least 3 terms out of 4 correct or $4^2-\sqrt{3}\times\sqrt{3}$<br>C1 for $\sqrt{13}$ from correct working |
| 15 a | | 200 | B1 200 or $2\times10^2$ |
| b | | 3 | B1 12 and $\frac{1}{4}$<br>A1 3 cao |
| c | | −2 | M1 $81=3^4$ or $\frac{1}{81}=3^{-4}$<br>A1 cao |
| 16 | | Events independent | C1 Statement that events are independent |

| Paper 1MA1: 1H | | | | |
|---|---|---|---|---|
| **Question** | | **Working** | **Answer** | **Notes** |
| 17 | | | $3 \pm \sqrt{17}$ | M1 For $(x-3)^2 - 9 - 8\ (=0)$ or $(x=)\frac{-(-6)\pm\sqrt{(-6)^2-4(1)(-8)}}{2(1)}$ allow sign error for $b$<br>M1 For $x - 3 = \pm\sqrt{17}$ or $x = \frac{6\pm\sqrt{68}}{2}$<br>A1 cao |
| 18 | | | 48 | P1 Identifies that $16 \div 8 = 2$ so $PL=2NP$<br>P1 Process to find area of $LMN$ $8 \times (2+1)^2\ (=72)$<br>P1 Completes process to find area of $LQM$ '72'−16 − 8<br>A1 48 cao |
| 19 | i | | 18 | M1 Uses frequency density for under 80 bar eg 7÷10<br>M1 Completes method to find over 105 minutes frequency eg 1.2 ×15 or $\frac{3}{4}\times(1.2\times20)$<br>A1 18 cao |
| | ii | | Reasoning | C1 Correct explanation about grouped data so actual values between 100 and 120 unknown |

| Paper 1MA1: 1H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 20 | | $3x$ | M1 Factorising numerator and denominator of first fraction $\frac{3(x+2)}{(x-5)(x+2)}$ $\left(=\frac{3}{(x-5)}\right)$<br>M1 Factorising denominator of second fraction $\frac{x+5}{x(x+5)(x-5)}$ $\left(=\frac{1}{x(x-5)}\right)$<br>M1 Multiplication by reciprocal $\frac{3(x+2)}{(x-5)(x+2)} \times \frac{x(x+5)(x-5)}{(x+5)}$<br>A1 Completing algebra to reach $3x$ |
| 21 | | $x < -3, x > 6$ | M1 Rearrange to $x^2 - 3x - 18 > 0$<br>M1 Correct method to solve $x^2 - 3x - 18 = 0$<br>M1 Establish critical values $-3$ and 6<br>A1 $x < -3, x > 6$ |
| 22 | | 60 | P1 process to start problem eg draw diagram and find gradient of $OA$ (= 3)<br>P1 process to find equation of tangent with $m = -1/\text{'3'}$<br>P1 process to find $x$-axis intercept of tangent<br>P1 process to find area of triangle<br>A1 cao |

Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

Centre Number | | | | | |

Candidate Number | | | | |

# Mathematics

## Paper 2 (Calculator)

**Higher Tier**

Specimen Papers Set 2
**Time: 1 hour 30 minutes**

Paper Reference
**1MA1/2H**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

### Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

S50158A



S 5 0 1 5 8 A 0 1 2 4

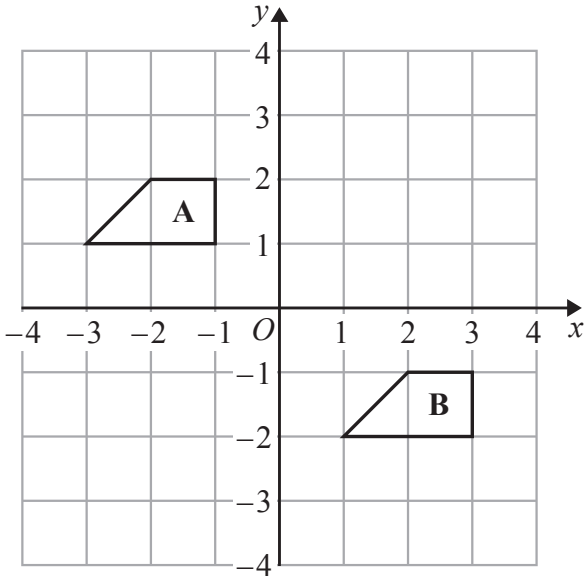
PEARSON

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1**



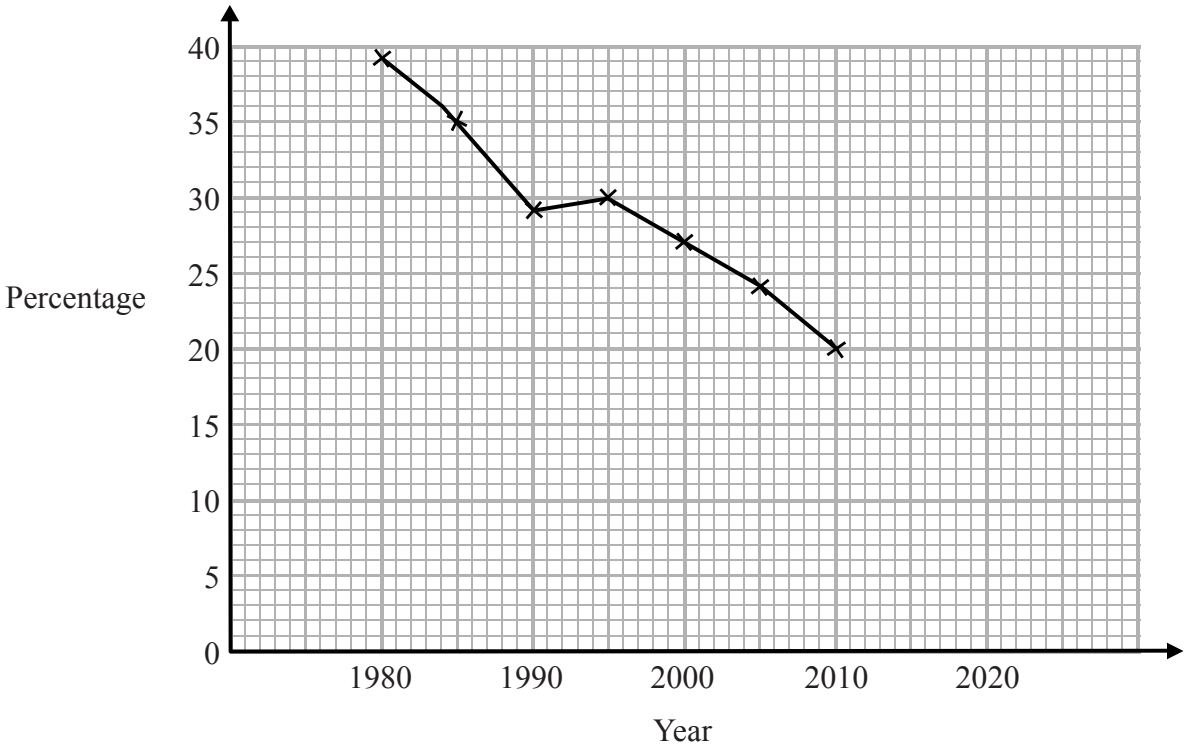

Describe the single transformation that maps shape **A** onto shape **B**.

.....

.....

**(Total for Question 1 is 2 marks)**

**2** The time series graph shows information about the percentages of the people in a village that used the village shop for the years between 1980 and 2010




(a) Describe the trend in the percentage of the people in the village who used the shop for this period.

.....

**(1)**

(b) (i) Use the graph to predict the percentage of the people in the village likely to use the shop in the year 2020

..... %

(ii) Is your prediction reliable?
Explain your answer.

.....

.....

**(3)**

**(Total for Question 2 is 4 marks)**

**3** (a) Expand and simplify $3(y - 2) + 5(2y + 1)$

.....

**(2)**

(b) Simplify $5u^2w^4 \times 7uw^3$

.....

**(2)**

**(Total for Question 3 is 4 marks)**

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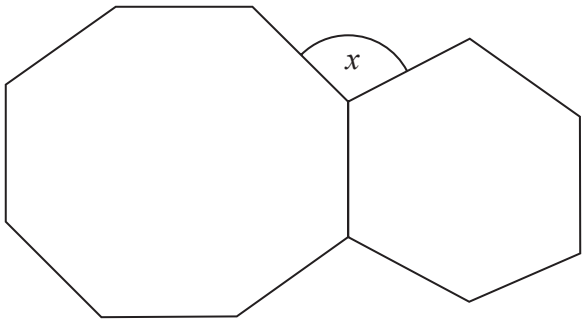
**4**



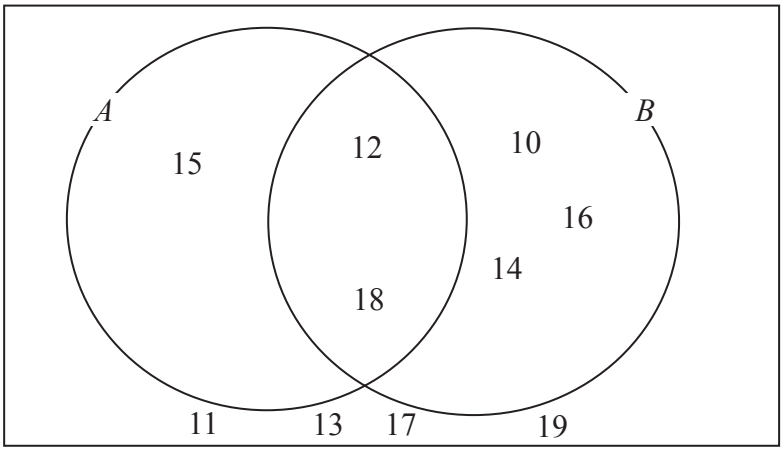

The diagram shows a regular octagon and a regular hexagon.

Find the size of the angle marked $x$
You must show all your working.

$x =$ ..... °

**(Total for Question 4 is 3 marks)**

**5** Here is a Venn diagram.




(a) Write down the numbers that are in set

(i) $A \cup B$

.....

(ii) $A \cap B$

.....

**(2)**

One of the numbers in the diagram is chosen at random.

(b) Find the probability that the number is in set $A'$

.....

**(2)**

**(Total for Question 5 is 4 marks)**

**6** On a farm

the number of cows and the number of sheep are in the ratio 6 : 5
the number of sheep and the number of pigs are in the ratio 2 : 1

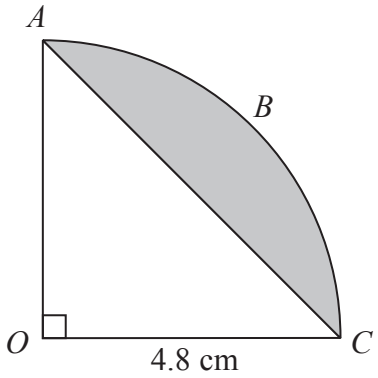
The total number of cows, sheep and pigs on the farm is 189

How many sheep are there on the farm?

.....

**(Total for Question 6 is 3 marks)**

**7**




The arc $ABC$ is a quarter of a circle with centre $O$ and radius 4.8 cm.
$AC$ is a chord of the circle.

Work out the area of the shaded segment.
Give your answer correct to 3 significant figures.

.....cm$^2$

**(Total for Question 7 is 3 marks)**

**8** Steve is asked to solve the equation $5(x + 2) = 47$

Here is his working.

$$5(x + 2) = 47$$
$$5x + 2 = 47$$
$$5x = 45$$
$$x = 9$$

Steve's answer is wrong.

(a) What mistake did he make?

.....

.....

**(1)**

Liz is asked to solve the equation $3x^2 + 8 = 83$

Here is her working.

$$3x^2 + 8 = 83$$
$$3x^2 = 75$$
$$x^2 = 25$$
$$x = 5$$

(b) Explain what is wrong with Liz's answer.

.....

.....

**(1)**

**(Total for Question 8 is 2 marks)**

**9** The functions f and g are such that

$$f(x) = 3(x - 4) \text{ and } g(x) = \frac{x}{5} + 1$$

(a) Find the value of f(10)

.....

**(1)**

(b) Find $g^{-1}(x)$

$g^{-1}(x) =$ .....

**(2)**

(c) Show that $ff(x) = 9x - 48$

**(2)**

**(Total for Question 9 is 5 marks)**

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**10** The population of a city increased by 5.2% for the year 2014

At the beginning of 2015 the population of the city was 1 560 000

Lin assumes that the population will continue to increase at a constant rate of 5.2% each year.

(a) Use Lin's assumption to estimate the population of the city at the beginning of 2017
Give your answer correct to 3 significant figures.

.....

**(3)**

(b) (i) Use Lin's assumption to work out the year in which the population of the city will reach 2 000 000

.....

(ii) If Lin's assumption about the rate of increase of the population is too low, how might this affect your answer to (b)(i)?

.....

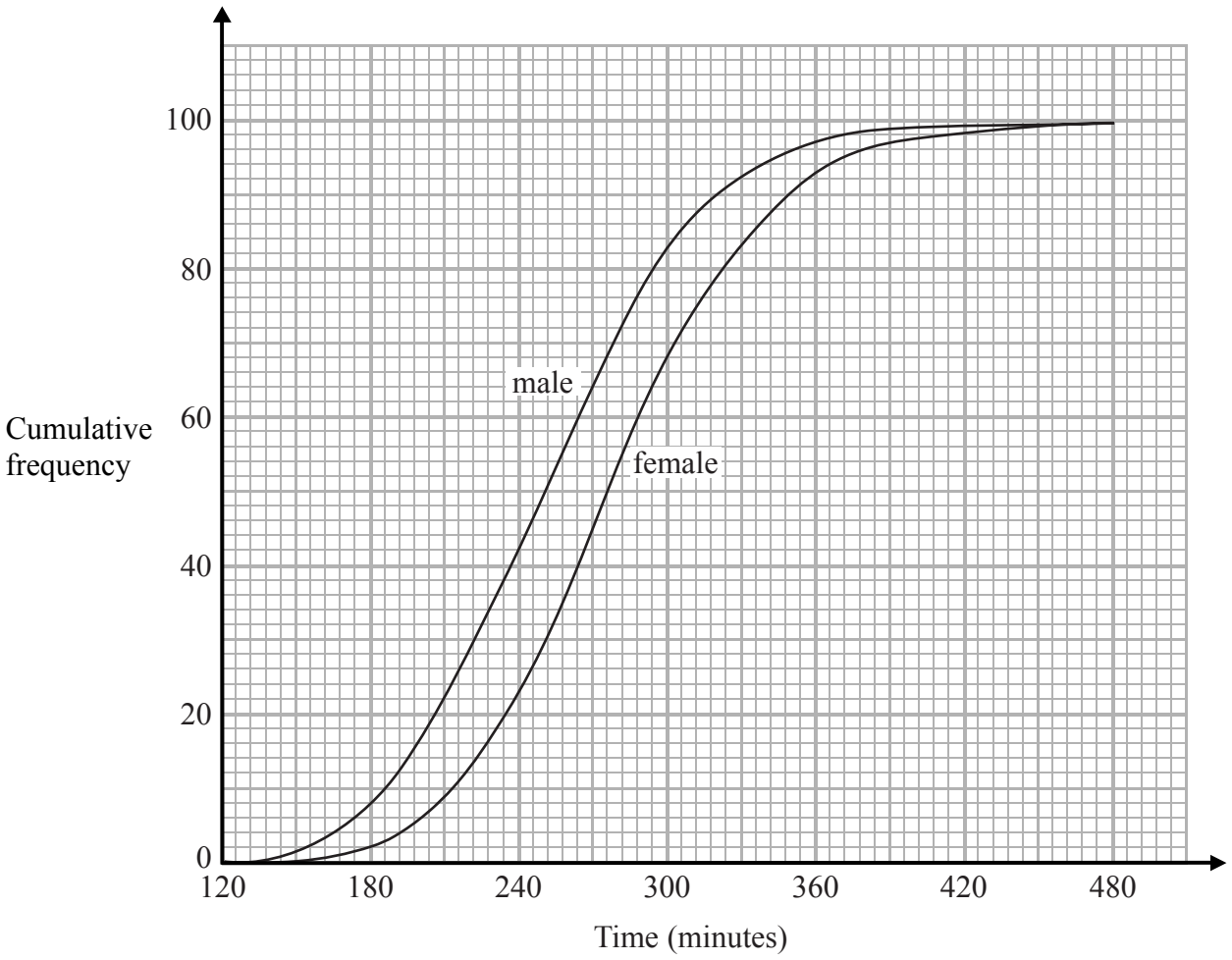
.....

.....

**(3)**

**(Total for Question 10 is 6 marks)**

**11** The cumulative frequency graphs show information about the times taken by 100 male runners and by 100 female runners to finish the London marathon.




A male runner is chosen at random.

(a) Find an estimate for the probability that this runner took less than 4 hours to finish the London marathon.

.....

**(2)**

(b) Use medians and interquartile ranges to compare the distribution of the times taken by the male runners with the distribution of the times taken by the female runners.

**(4)**

**(Total for Question 11 is 6 marks)**

**12** Marie has 25 cards.
Each card has a different symbol on it.

Marie gives one card to Shelley and one card to Pauline.

(a) In how many different ways can Marie do this?

**(2)**

There are 12 boys and 10 girls in David's class.
David is going to pick three different students from his class and write their names in a list in order.

The order will be

| | | |
|---|---|---|
| boy<br>girl<br>boy | **or** | girl<br>boy<br>girl |

(b) How many different lists can David write?

**(3)**

**(Total for Question 12 is 5 marks)**

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**13** The number of slugs in a garden $t$ days from now is $p_t$ where

$p_0 = 100$

$p_{t+1} = 1.06p_t$

Work out the number of slugs in the garden 3 days from now.

.....

**(Total for Question 13 is 3 marks)**

**14** $D$ is directly proportional to the cube of $n$.

Mary says that when $n$ is doubled, the value of $D$ is multiplied by 6

Mary is wrong.
Explain why.

.....

.....

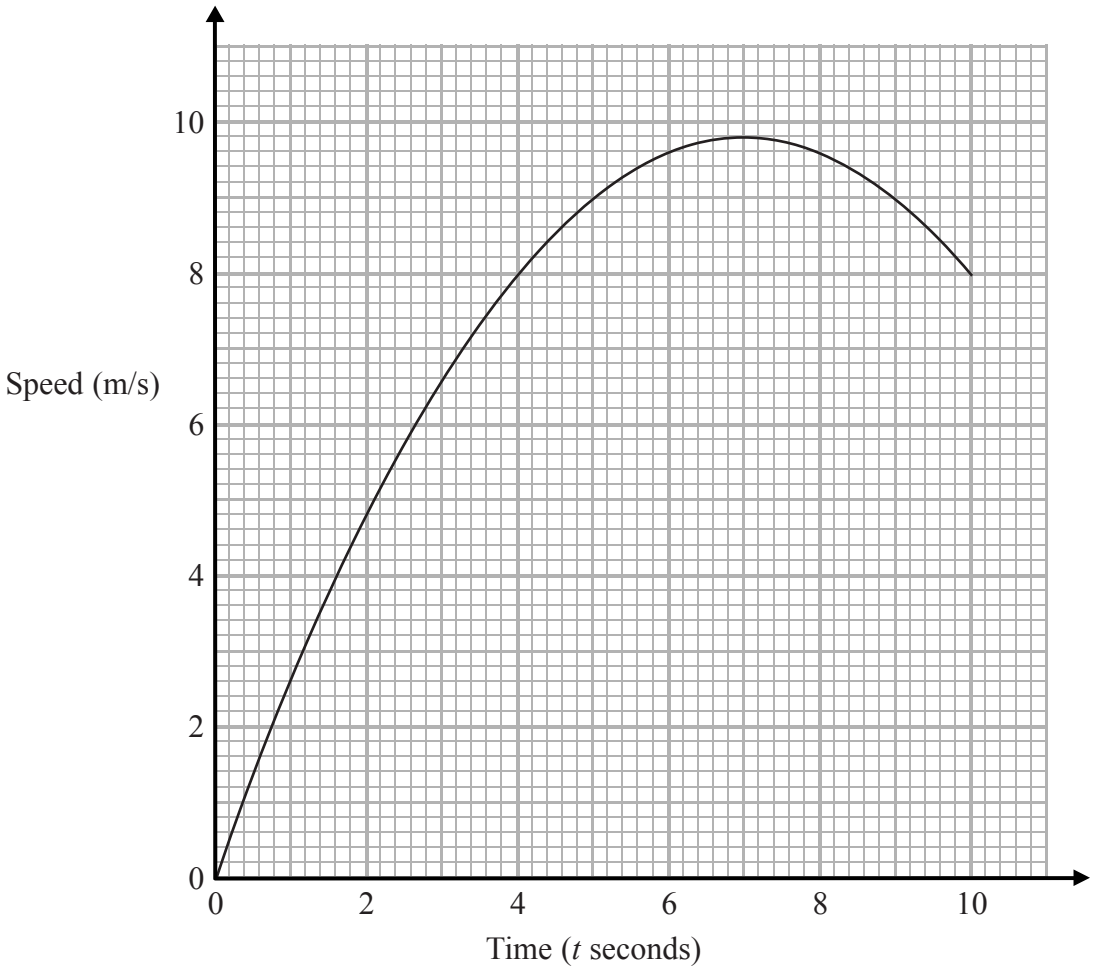
.....

**(1)**

**(Total for Question 14 is 1 mark)**

**15** Karol runs in a race.

The graph shows her speed, in metres per second, $t$ seconds after the start of the race.




(a) Calculate an estimate for the gradient of the graph when $t = 4$
You must show how you get your answer.

**(3)**

(b) Describe fully what your answer to part (a) represents.

.....

.....

**(2)**

(c) Explain why your answer to part (a) is only an estimate.

.....

.....

**(1)**

**(Total for Question 15 is 6 marks)**

**16** (i) Find the value of $\sqrt[5]{3.2 \times 10^{11}}$

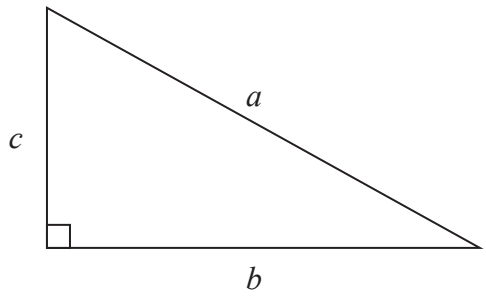
.....

(ii) Find the value of $10^{\frac{3}{4}}$
Give your answer correct to 1 decimal place.

.....

**(Total for Question 16 is 2 marks)**

**17**




*a* is 8.3 cm correct to the nearest mm
*b* is 6.1 cm correct to the nearest mm

Calculate the upper bound for *c*.
You must show your working.

..... cm

**(Total for Question 17 is 4 marks)**

**18** Simplify fully $(\sqrt{a} + \sqrt{4b})(\sqrt{a} - 2\sqrt{b})$

.....

**(Total for Question 18 is 3 marks)**

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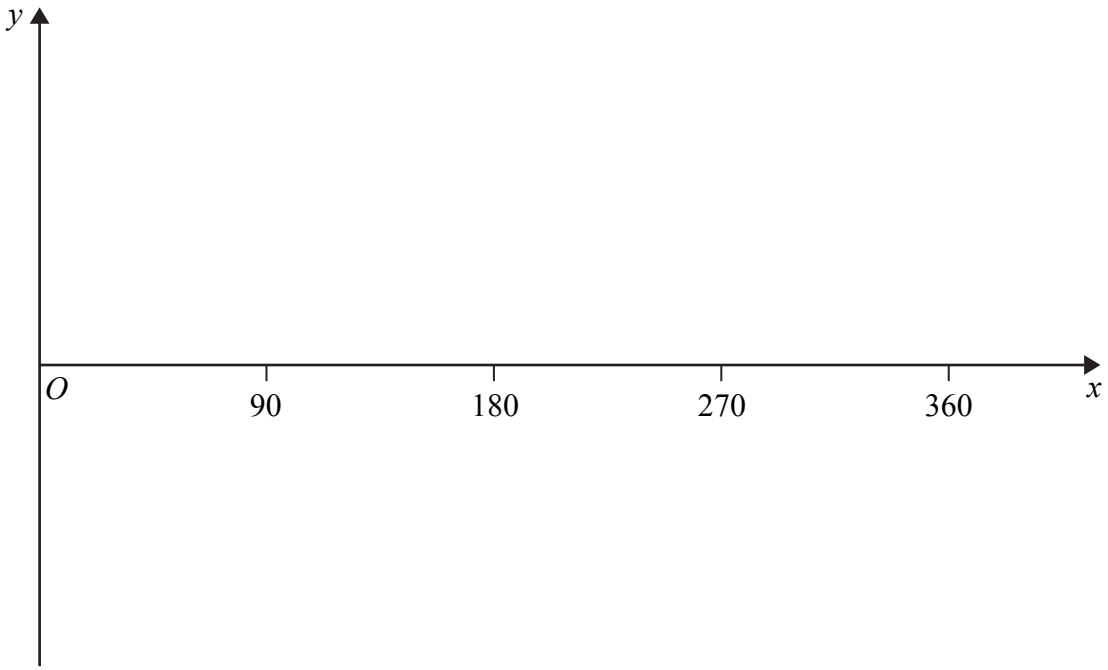
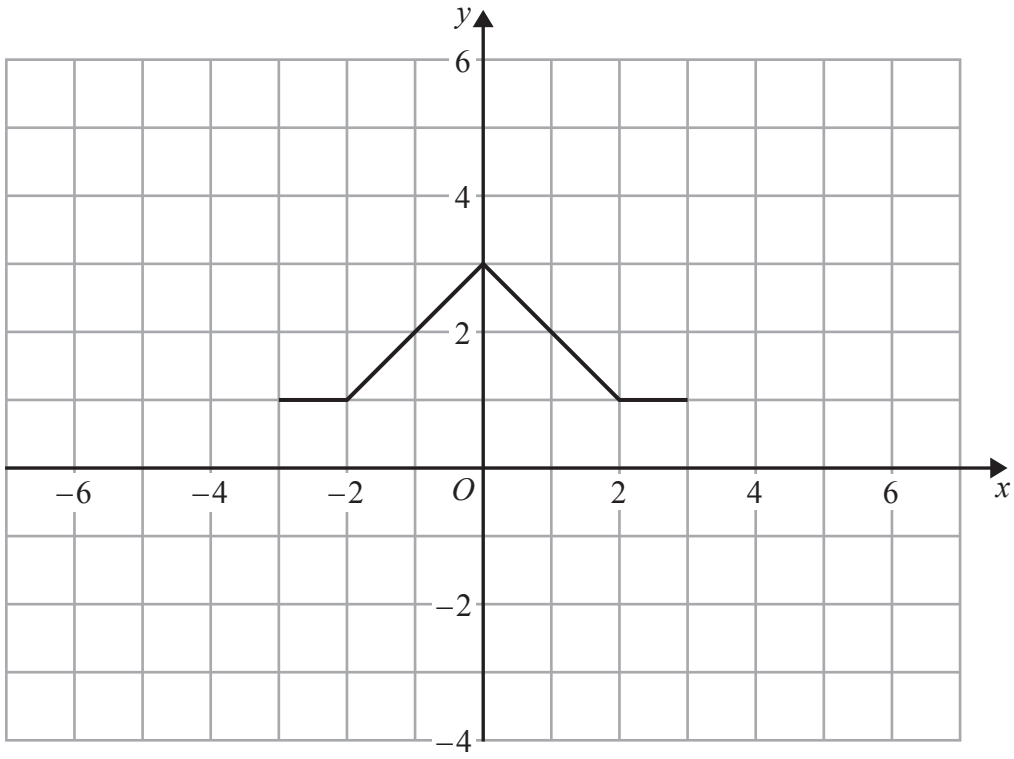
**19** (a) Sketch the graph of $y = \cos x°$ for $0 \leqslant x \leqslant 360$



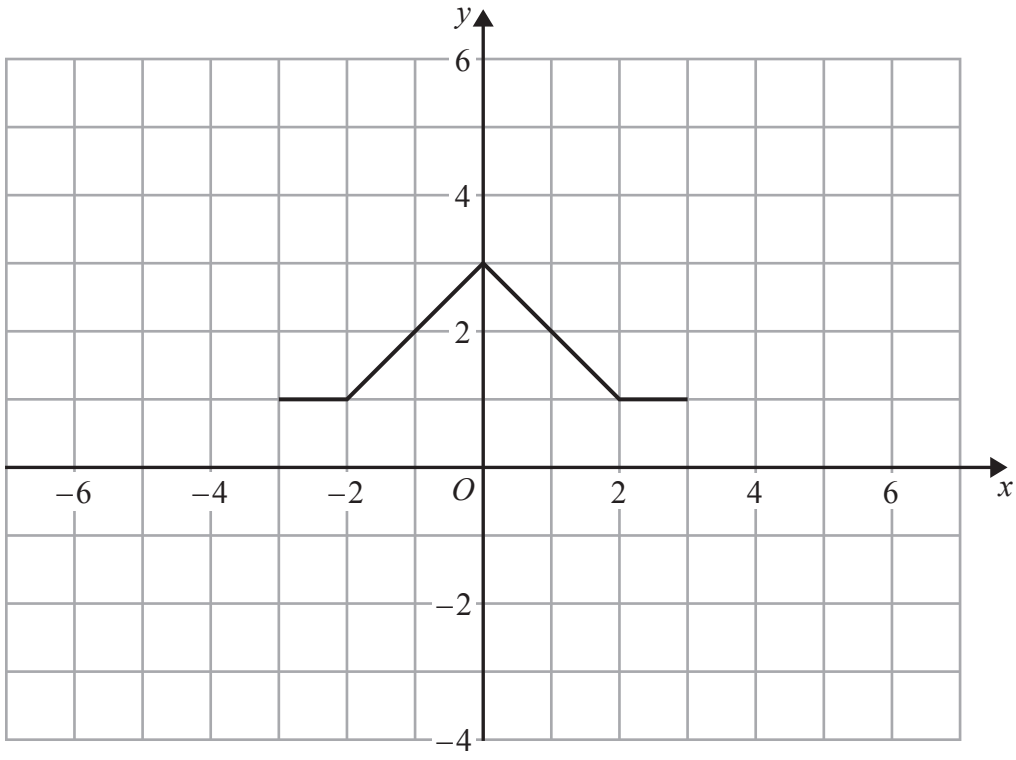

**(2)**

(b) The graph of $y = f(x)$ is shown on both grids below.

(i) On this grid, draw the graph of $y = 2f(x)$



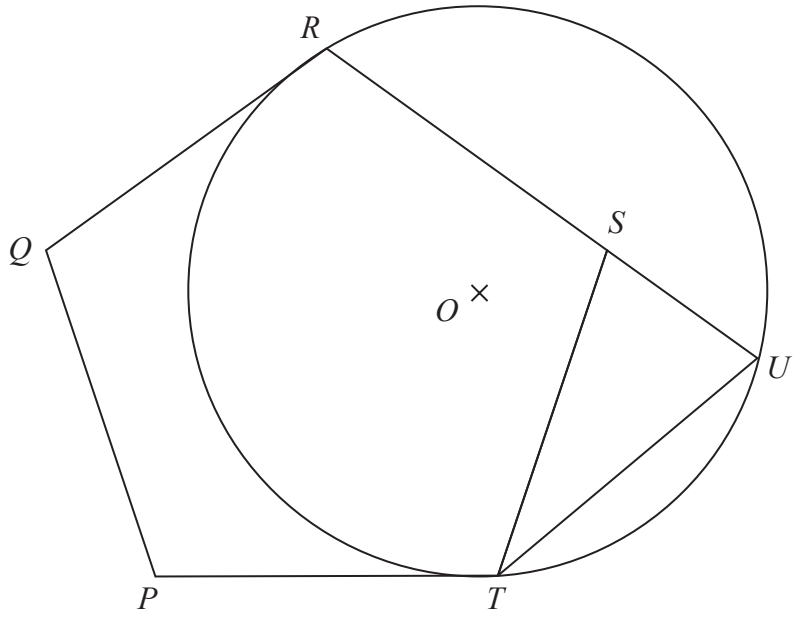

(ii) On the grid below, draw the graph of $y = f(x - 3)$




**(2)**

**(Total for Question 19 is 4 marks)**

**20**




*PQRST* is a regular pentagon.
*R*, *U* and *T* are points on a circle, centre *O*.
*QR* and *PT* are tangents to the circle.
*RSU* is a straight line.

Prove that $ST = UT$.

**(Total for Question 20 is 5 marks)**

**21** Given that

$$2x - 1 \ : \ x - 4 \ = \ 16x + 1 \ : \ 2x - 1$$

find the possible values of $x$.

**(Total for Question 21 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

**BLANK PAGE**

| Paper 1MA1: 2H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 1 | | Translation by $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ | B1 for translation<br>B1 $\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ |
| 2 (a) | | Trend described | C1 for "percentage of people who use the shop decreases" oe |
| (bi) | | 13 - 17 | P1 for process to draw trend line on graph<br>A1 for 13 - 17 |
| (bii) | | No + reason | C1 for comment, eg "no, because 2020 is beyond the time period covered by the given data" |
| 3 (a) | | $13y - 1$ | M1 for expansion of one bracket<br>A1 for full simplification |
| (b) | | $35u^3w^7$ | B1 for 2 of 35, $u^3$ and $w^7$ correct<br>B1 cao |
| 4 | | 105 | P1 for process to find the exterior angle or interior angle of a hexagon or octagon<br>P1 for process to find the both exterior angles or both interior angles<br>A1 for 105 from correct working |

| Paper 1MA1: 2H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 5 (a)(i) | | 10, 12, 14, 15, 16, 18 | B1 cao |
| (ii) | | 12, 18 | B1 cao |
| (b) | | $\frac{7}{10}$ | M1 for 7 or indicating correct region or for 10, 14, 16, 11, 13, 17, 19 listed |
| | | | A1 for $\frac{7}{10}$ oe |
| 6 | 6 : 5 = 12 : 10<br>2 : 1 = 10 : 5<br>C : S : P = 12 : 10 : 5<br>$\frac{10}{27} \times 189$ | 70 | P1 P1 for strategy to start to solve the problem eg 12 : 10 and 10: 5<br>P1 P1 for process to solve the problem eg $\frac{10}{27} \times 189$<br>A1 A1 cao |
| 7 | $\frac{1}{4} \times \pi \times 4.8^2$<br>$\frac{1}{2} \times 4.8 \times 4.8$<br>$\frac{1}{4} \times \pi \times 4.8^2 - \frac{1}{2} \times 4.8 \times 4.8$ | 6.58 | B1 for use of formula for area of a circle<br>P1 for complete process to find area of shaded region<br>A1 for 6.56 – 6.58 |

| Paper 1MA1: 2H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 8 (a) | | explanation | C1 for "incorrect expansion of brackets" oe |
| (b) | | explanation | C1 for "has not obtained both solutions" oe |
| 9 (a) | | 18 | B1 cao |
| (b) | | $5(x - 1)$ | M1 for method to find inverse function<br>A1 for $5(x - 1)$ or $5x - 5$ |
| (c) | | $9x - 48$ shown | M1 for method to find composite function<br>A1 for working leading to $9x - 48$ |
| 10 (a) | $1560000 \times (1.052)^2$ | 1730000 | P1 for process to find population in 2016<br>P1 for complete process to find population in 2017<br>A1 for 1725000 - 1730000 |
| (b)(i) | | 2020 | P1 for process to find when population will exceed 2 000 000<br>A1 for 2020 |
| (ii) | | | C1 for correct comment on how assumption will affect the answer, eg if the percentage growth is higher the population may exceed 2 000 000 earlier. |

| Paper 1MA1: 2H | | | | |
|---|---|---|---|---|
| Question | | Working | Answer | Notes |
| 11 | (a) | | 0.43 | M1 for use of graph at 240 minutes<br>A1 for 0.42 – 0.44 oe |
| | (b) | | comparison | B1 for at least one median (249 – 252 or 273 – 276)<br>B1 for least one interquartile range (69 – 73 or 67 - 71)<br>C1 for comment comparing average times eg females take longer than males oe<br>C1 for comment comparing spreads of times from IQRs, eg the spread of times is about the same<br><br>(NB – at least one of the comments must be in context) |
| 12 | (a) | 25 × 24 | 600 | P1 for process to find number of ways<br>A1 cao |
| | (b) | 12 × 10 × 11<br>10 × 12 × 9<br>1320 + 1080 | 2400 | P1 for process to find number of lists with boy then girl then boy or the number of lists with girl then boy then girl<br>P1 for complete process to find the total number of lists<br>A1 cao |

| Paper 1MA1: 2H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 13 | | 119 | M1 for $1.06 \times 100$ oe<br>M1 for $1.06^3 \times 100$ oe<br>A1 accept 119.1016 |
| 14 | | explanation | C1 for a correct evaluation, eg the value of $D$ should be multiplied by 8, she has used $2 \times 3$ instead of $2^3$ |
| 15 (a) | | 1.0 – 1.3 | M1 for finding gradient by drawing tangent<br>M1 for method to calculate gradient<br>A1 For 1.0 – 1.3 |
| (b) | | | C1 for acceleration<br>C1 for eg " 4 second after the start of the race", "when the speed is 7.6 m/s", "in $m/s^2$" |
| (c) | | limitation | C1 for comment, eg dependent on accuracy of constructing a tangent |
| 16 (i) | | 200 | B1 cao |
| (ii) | | 5.6 | B1 For 5.6(2...) |

| Paper 1MA1: 2H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 17 | $\sqrt{8.35^2 - 6.05^2}$ | 5.754997828 | B1 for finding bounds of one measurement,8.25 8.35, 6.05 or 6.15<br>P1 for process of choosing and using correct bounds<br>P1 for process of Pythagoras' rule with correct bounds<br>A1 for 5.754(997…) |
| 18 | $(\sqrt{a} + 2\sqrt{b})(\sqrt{a} - 2\sqrt{b})$<br>$\sqrt{a} \times \sqrt{a} - 2\sqrt{a}\sqrt{b} +$<br>$2\sqrt{b}\sqrt{a} - 2\sqrt{b} \times 2\sqrt{b}$ | $a - 4b$ | M1 for expansion of brackets or $\sqrt{4b} = 2\sqrt{b}$<br>M1 for $a$ or $(-4b)$<br>A1 cao |
| 19 (a) | | sketch | B1 for correct shape for $0 \leqslant x \leqslant 360$<br>B1 for fully correct sketch with labels |
| (b)(i) | | sketch | B1 cao |
| (ii) | | sketch | B1 cao |

| Paper 1MA1: 2H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 20 | ∠ *TSU* = 360 ÷ 5 (=72)<br>Exterior angles of a polygon add up to 360°<br>∠ *QRO* = ∠ *OTP* = 90<br>The tangent to a circle is perpendicular (90°)to the radius (diameter)<br>∠ *ROT* = 540 – 2 × 90 – 2 × 108 (= 144)<br>∠ *RUT* = 144 ÷ 2 (= 72)<br>The angle at the centre of a circle is twice the angle at the circumference<br>Base angles of an isosceles triangle are equal | proof | M1 for method to find interior or exterior angle of regular pentagon<br>M1 for using angle between tangent and radius<br>M1 for method to find angle *ROT*<br>C1 for method to find angle *RUT* with reason<br>C1 for deduction that *ST* = *UT* with reasons |
| 21 | $\frac{2x-1}{x-4} = \frac{16x+1}{2x-1}$<br>$(2x-1)^2 = (16x+1)(x-4)$<br>$12x^2 - 59x - 5 = 0$<br>$(12x+1)(x-5) = 0$ | $-\frac{1}{12}$, 5 | P1 for process to write as an equation<br>P1 for process to clear the fractions<br>P1 for process to write equation in form $ax^2 + bx + c = 0$<br>P1 for process to solve the equation<br>A1 cao |

Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson Edexcel**
**Level 1/Level 2 GCSE (9 - 1)**

| Centre Number | Candidate Number |
|---|---|
| | |

# Mathematics

## Paper 3 (Calculator)

**Higher Tier**

| Specimen Papers Set 2 | Paper Reference |
|---|---|
| **Time: 1 hour 30 minutes** | **1MA1/3H** |

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a $\pi$ button, take the value of $\pi$ to be 3.142 unless the question instructs otherwise.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

### Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

S50160A



S 5 0 1 6 0 A 0 1 2 4

PEARSON

**Answer ALL questions.**

**Write your answers in the spaces provided.**

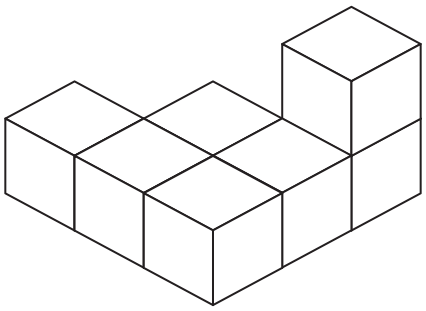
**You must write down all the stages in your working.**

**1** The ratio of the number of boys to the number of girls in a school is 4 : 5
There are 95 girls in the school.

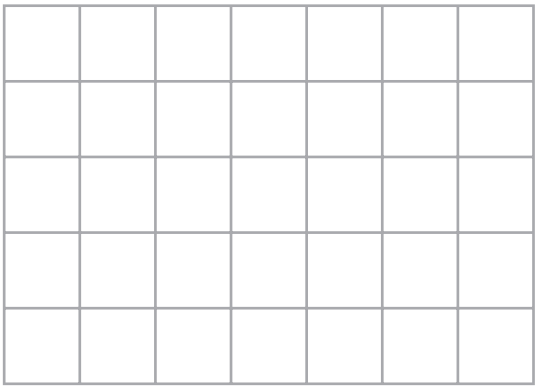
Work out the total number of students in the school.

**(Total for Question 1 is 3 marks)**

**2** The diagram represents a solid made from seven centimetre cubes.



On the centimetre grid below, draw a plan of the solid.



**(Total for Question 2 is 2 marks)**

**3** Make $t$ the subject of the formula $y = \frac{t}{3} - 2a$

.....

**(Total for Question 3 is 2 marks)**

**4** Jim rounds a number, $x$, to one decimal place.
The result is 7.2

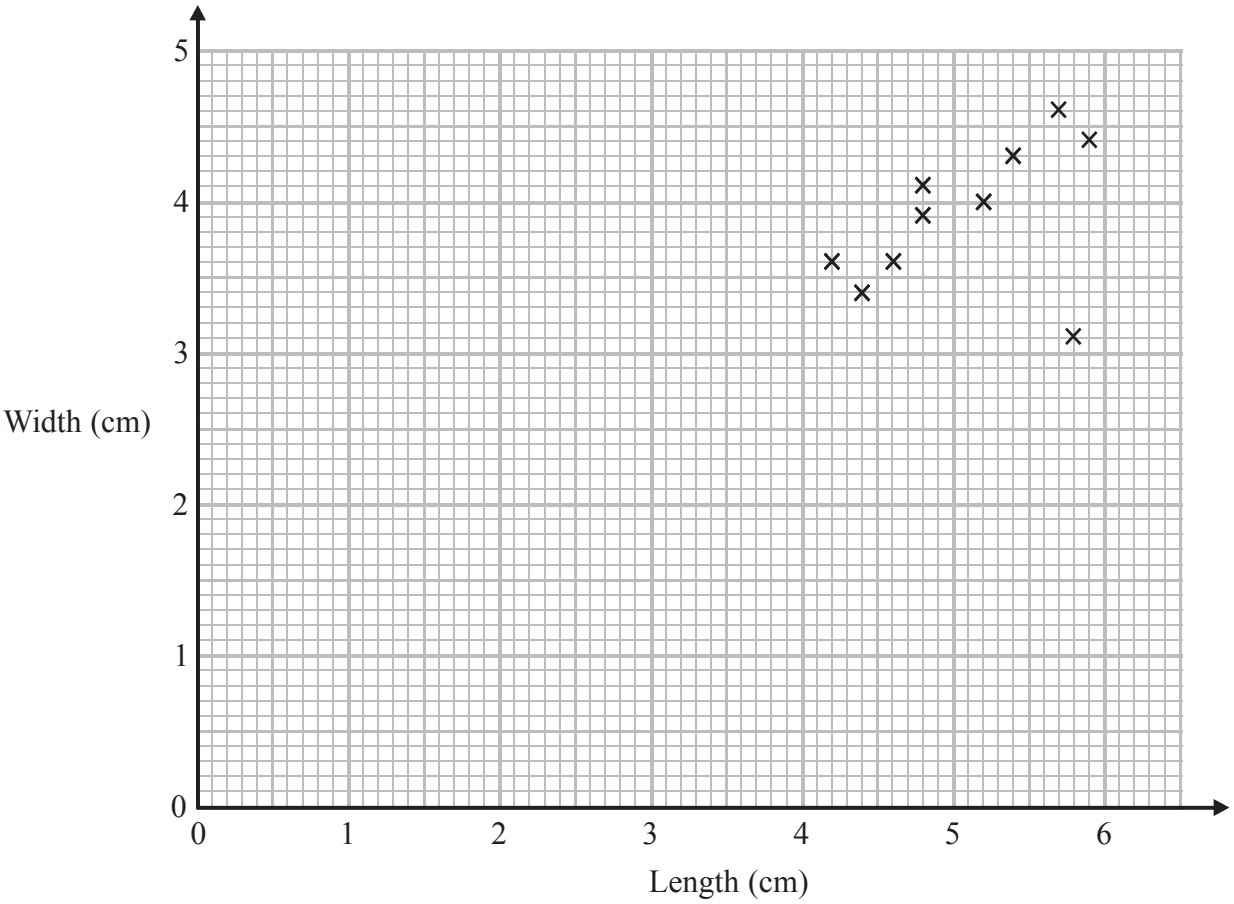
Write down the error interval for $x$.

.....

**(Total for Question 4 is 2 marks)**

**5** Katie measured the length and the width of each of 10 pine cones from the same tree.

She used her results to draw this scatter graph.




(a) Describe one improvement Katie can make to her scatter graph.

.....

.....

**(1)**

The point representing the results for one of the pine cones is an outlier.

(b) Explain how the results for this pine cone differ from the results for the other pine cones.

.....

.....

**(1)**

**(Total for Question 5 is 2 marks)**

**6** At a depth of $x$ metres, the temperature of the water in an ocean is $T$°C.
At depths below 900 metres, $T$ is inversely proportional to $x$.

$T$ is given by

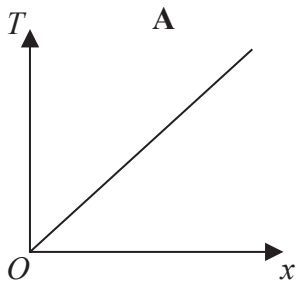
$$T = \frac{4500}{x}$$

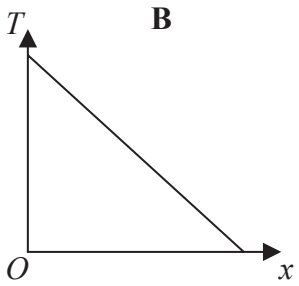
(a) Work out the difference in the temperature of the water at a depth of 1200 metres and the temperature of the water at a depth of 2500 metres.

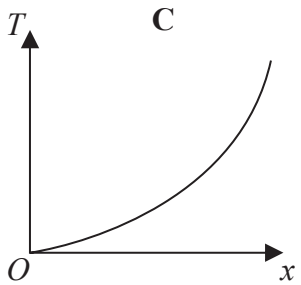
.....°C

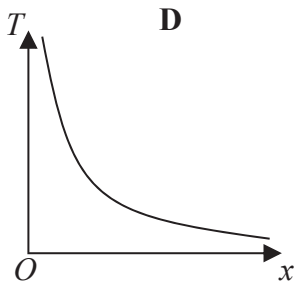
**(3)**

Here are four graphs.




One of the graphs could show that $T$ is inversely proportional to $x$.

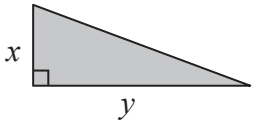
(b) Write down the letter of this graph.

.....

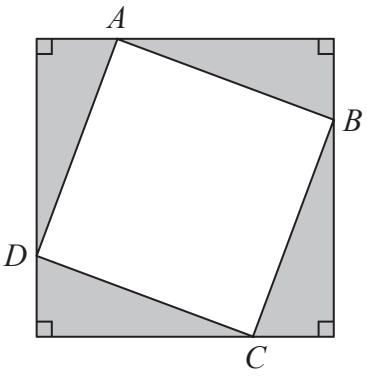
**(1)**

**(Total for Question 6 is 4 marks)**

**7** Here is a right-angled triangle.



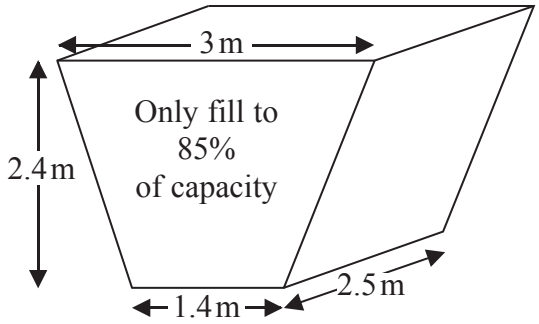

Four of these triangles are joined to enclose the square *ABCD* as shown below.




Show that the area of the square *ABCD* is $x^2 + y^2$

**(Total for Question 7 is 3 marks)**

**8** The diagram shows an oil tank in the shape of a prism.
The cross section of the prism is a trapezium.




The tank is empty.

Oil flows into the tank.
After one minute there are 300 litres of oil in the tank.

Assume that oil continues to flow into the tank at this rate.

(a) Work out how many **more** minutes it takes for the tank to be 85% full of oil.
($1\,m^3 = 1000$ litres)

..... minutes
**(5)**

The assumption about the rate of flow of the oil could be wrong.

(b) Explain how this could affect your answer to part (a).

.....

.....

**(1)**

**(Total for Question 8 is 6 marks)**

**9** Ibrar bought a house for £145 000

The value of the house depreciated by 4% in the first year.
The value of the house depreciated by 2.5% in the second year.

Ibrar says,

"4 + 2.5 = 6.5 so in two years the value of my house depreciated by 6.5%"

(a) Is Ibrar right?
You must give a reason for your answer.

.....

.....

.....

**(2)**

The value of Ibrar's house increases by $x$% in the third year.
At the end of the third year the value of Ibrar's house is £140 000

(b) Work out the value of $x$.
Give your answer correct to 3 significant figures.

.....

**(3)**

**(Total for Question 9 is 5 marks)**

**10** The surface gravity of a planet can be worked out using the formula

$$g = \frac{6.67 \times 10^{-11}\, m}{r^2}$$

where

$m$ kilograms is the mass of the planet
$r$ metres is the radius of the planet

For the Earth and Jupiter here are the values of $m$ and $r$.

| Earth | Jupiter |
|---|---|
| $m = 5.98 \times 10^{24}$<br>$r = 6.378 \times 10^{6}$ | $m = 1.90 \times 10^{27}$<br>$r = 7.149 \times 10^{7}$ |

Work out the ratio of the surface gravity of Earth to the surface gravity of Jupiter.
Write your answer in the form $1 : n$

**(Total for Question 10 is 3 marks)**

**11** Solve the simultaneous equations

$$2x - 4y = 19$$
$$3x + 5y = 1$$

$x =$ .....

$y =$ .....

**(Total for Question 11 is 4 marks)**

**12** Zahra mixes 150 g of metal A and 150 g of metal B to make 300 g of an alloy.

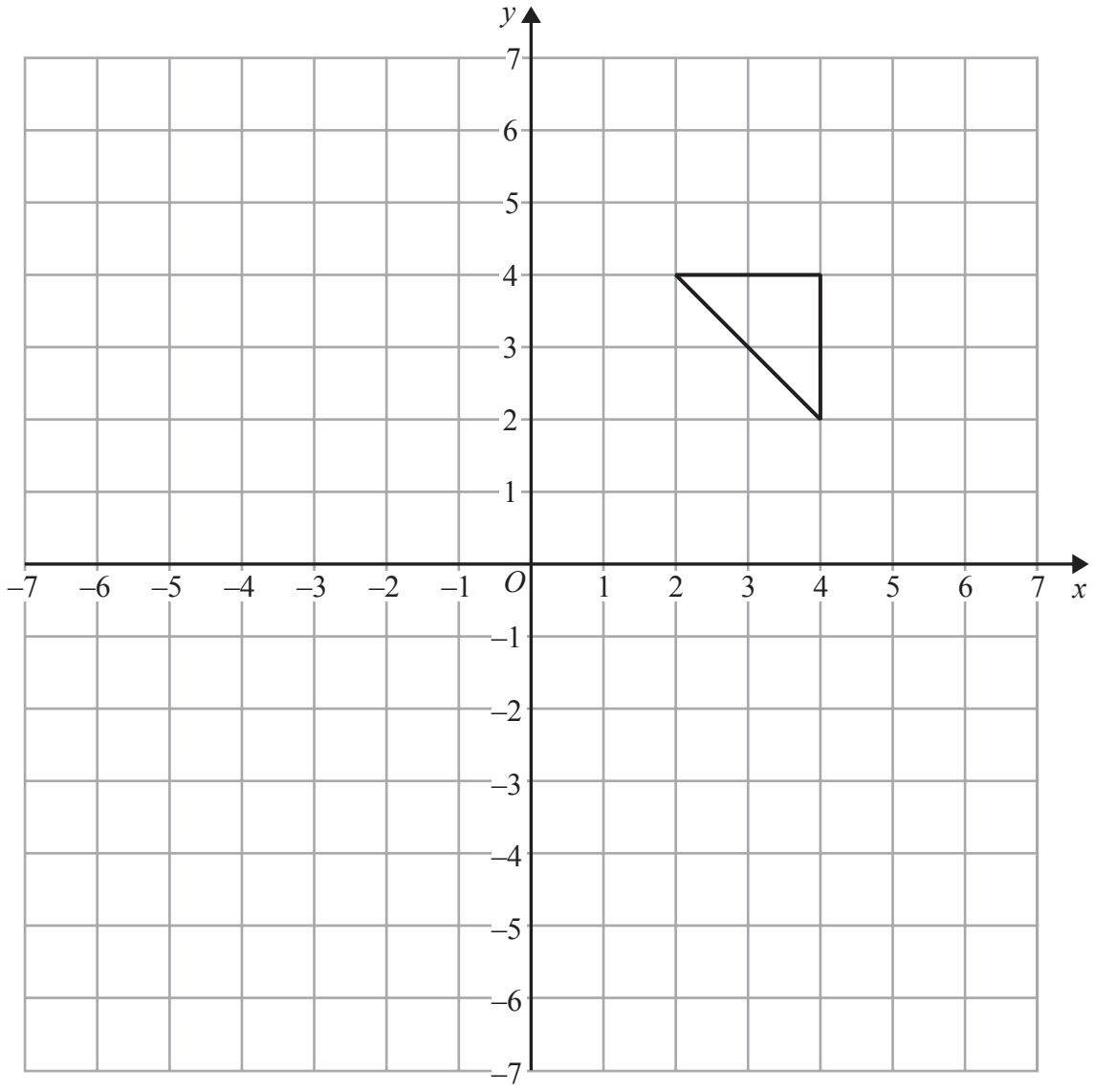
Metal A has a density of 19.3 g/cm$^3$.
Metal B has a density of 8.9 g/cm$^3$.

Work out the density of the alloy.

..... g/cm$^3$

**(Total for Question 12 is 4 marks)**

**13**



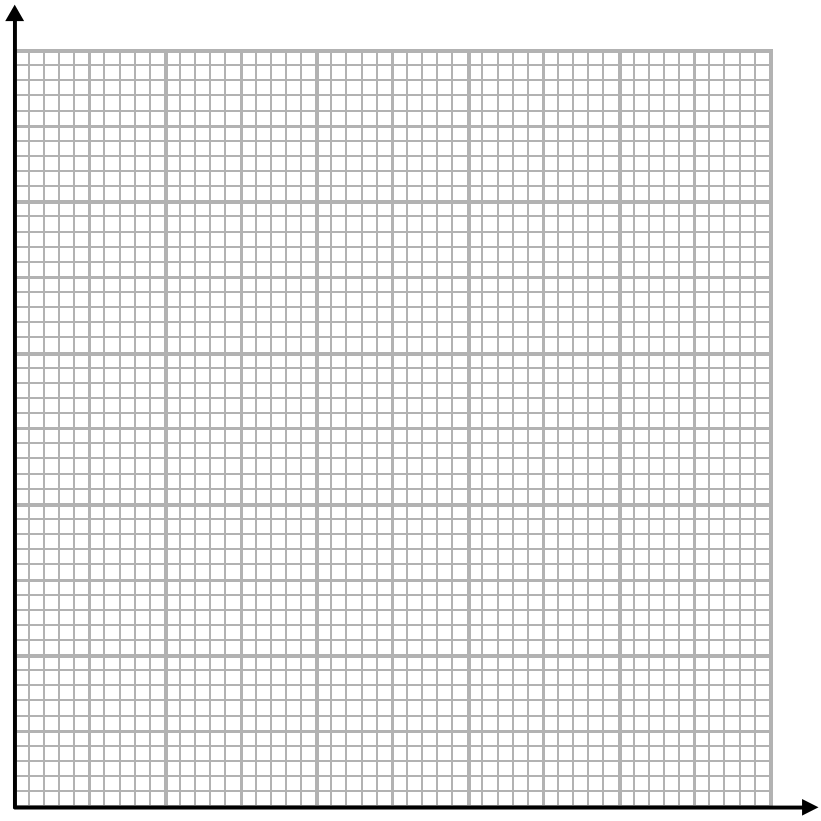

On the grid, enlarge the triangle by scale factor $-1\frac{1}{2}$, centre (0, 2)

**(Total for Question 13 is 2 marks)**

**14** The table gives information about the speeds, in km/h, of 81 cars.

| Speed ($s$ km/h) | Frequency |
|---|---|
| $90 < s \leqslant 100$ | 13 |
| $100 < s \leqslant 105$ | 16 |
| $105 < s \leqslant 110$ | 18 |
| $110 < s \leqslant 120$ | 22 |
| $120 < s \leqslant 140$ | 12 |

(a) On the grid, draw a histogram for the information in the table.



**(3)**

(b) Find an estimate for the median.

.....km/h

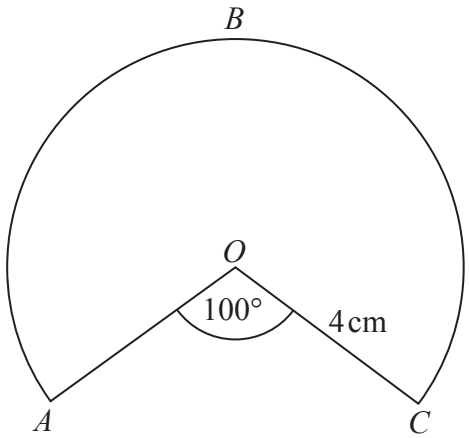
**(2)**

**(Total for Question 14 is 5 marks)**

**15** Show that $\frac{a}{b+1} - \frac{a}{(b+1)^2}$ can be written as $\frac{ab}{(b+1)^2}$

**(Total for Question 15 is 2 marks)**

**16** The diagram shows a sector of a circle of radius 4 cm.




Work out the length of the arc $ABC$.
Give your answer correct to 3 significant figures.

.....cm

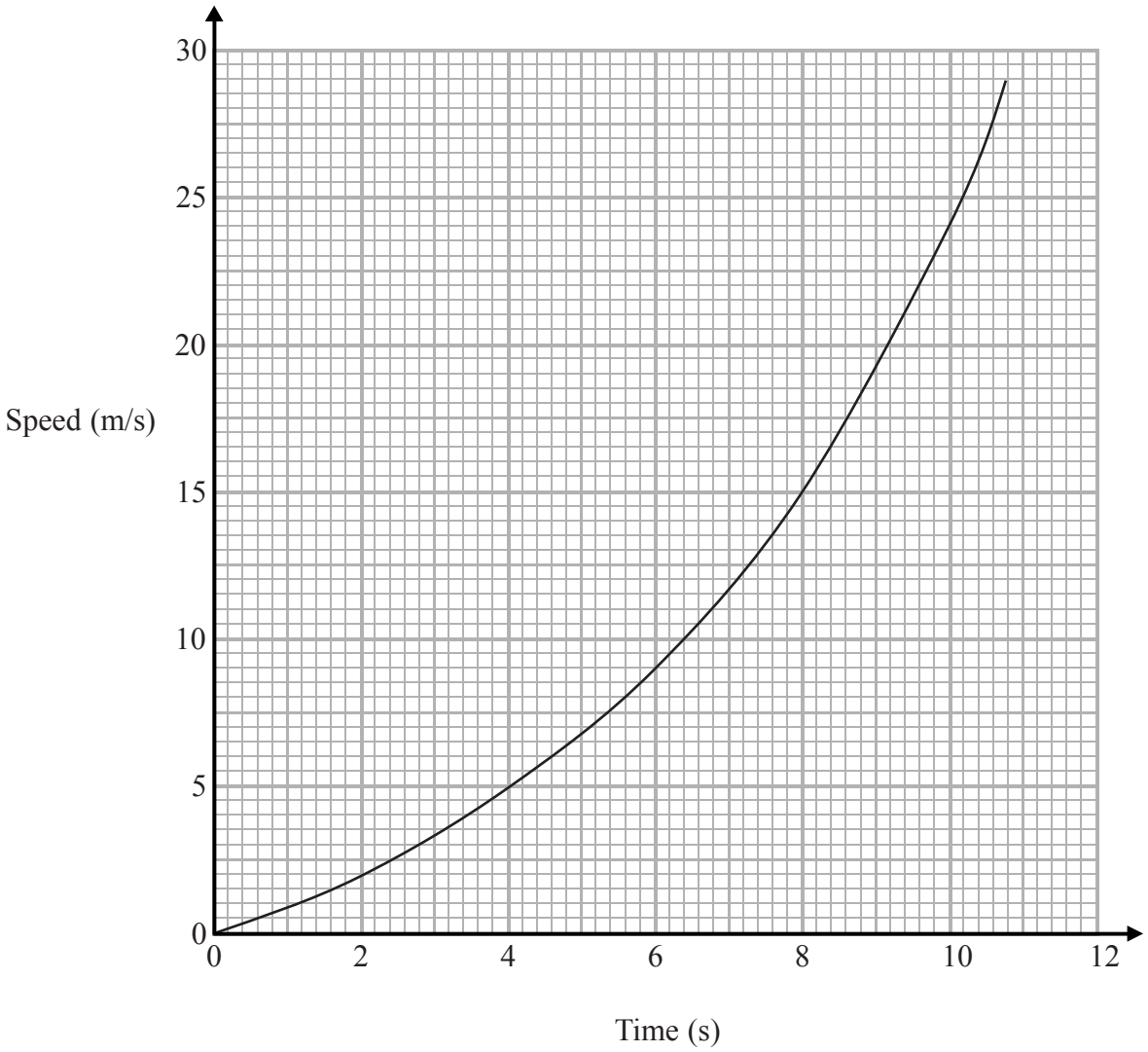
**(Total for Question 16 is 2 marks)**

**17** The product of two consecutive positive integers is added to the larger of the two integers.

Prove that the result is always a square number.

**(Total for Question 17 is 3 marks)**

**18** Here is a speed-time graph for a car.




(a) Work out an estimate for the distance the car travelled in the first 10 seconds.
Use 5 strips of equal width.

.....m

**(3)**

(b) Is your answer to (a) an underestimate or an overestimate of the actual distance?
Give a reason for your answer.

.....

.....

**(1)**

**(Total for Question 18 is 4 marks)**

DO NOT WRITE IN THIS AREA

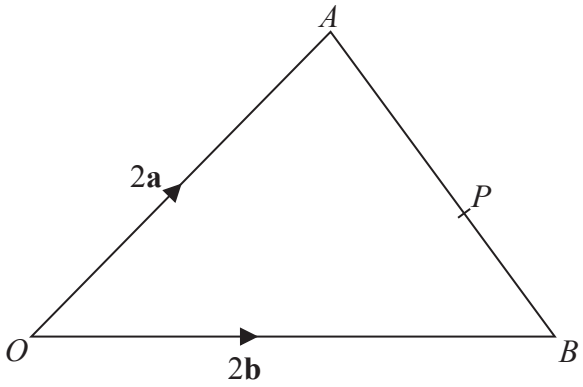
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

**19** Prove algebraically that the recurring decimal $0.3\dot{1}\dot{8}$ can be written as $\frac{7}{22}$

**(Total for Question 19 is 2 marks)**

**20**




$OAB$ is a triangle.
$P$ is the point on $AB$ such that $AP : PB = 5 : 3$

$\overrightarrow{OA} = 2\mathbf{a}$

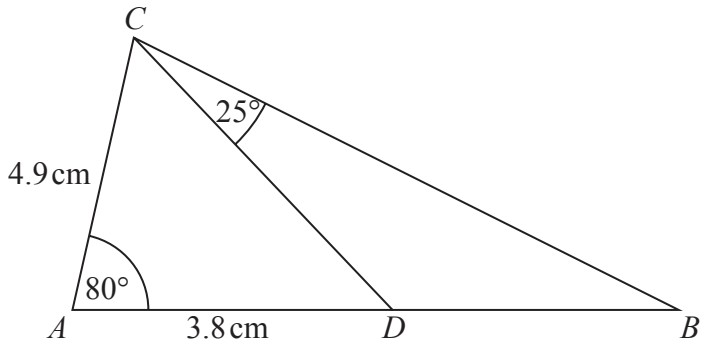
$\overrightarrow{OB} = 2\mathbf{b}$

$\overrightarrow{OP} = k(3\mathbf{a} + 5\mathbf{b})$ where $k$ is a scalar quantity.

Find the value of $k$.

**(Total for Question 20 is 4 marks)**

**21**




*ABC* is a triangle.
*D* is a point on *AB*.

Work out the area of triangle *BCD*.
Give your answer correct to 3 significant figures.

..... $cm^2$

**(Total for Question 21 is 5 marks)**

**22** There are $y$ black socks and 5 white socks in a drawer.

Joshua takes at random two socks from the drawer.

The probability that Joshua takes one white sock and one black sock is $\frac{6}{11}$

(a) Show that $3y^2 - 28y + 60 = 0$

**(4)**

(b) Find the probability that Joshua takes two black socks.

**(3)**

**(Total for Question 22 is 7 marks)**

**23** (a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where $a$, $b$, and $c$ are integers.

.....

**(3)**

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

.....

**(1)**

**(Total for Question 23 is 4 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

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| Paper 1MA1: 3H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 1 | | 171 | P1 for process to find one share<br>P1 for process to find total<br>A1 cao |
| 2 | | plan | C1 a partially correct plan<br>C1 correct plan |
| 3 | | $t = 3(y + 2a)$ | M1 adding $2a$ to both sides or multiplying each term by 3<br>A1 $t = 3(y + 2a)$ or $t = 3y + 6a$ |
| 4 | | $7.15 \leq x < 7.25$ | B1 for 7.15 and 7.25<br>B1 cao |
| 5 (a) | | improvement | C1 appropriate improvement eg do not have axes starting at (0, 0) |
| (b) | | explanation | C1 explanation eg pine cone has a very short width for its length |
| 6 (a) | | 1.95 | M1 method to find one temperature eg 4500 ÷ 1200<br>M1 for complete method<br>A1 cao |
| (b) | | D | B1 cao |

| Paper 1MA1: 3H | | | | |
|---|---|---|---|---|
| Question | Working | Answer | Notes | |
| 7 | | complete chain of reasoning | C1 | starts chain of reasoning eg finds area of large square and area of triangle or use of Pythagoras |
| | | | C1 | for $(x+y)^2 - 4\times(x\times y\div 2)$ oe or $\sqrt{x^2+y^2}\times\sqrt{x^2+y^2}$ |
| | | | C1 | complete chain of reasoning with correct algebra |
| 8 (a) | | 36.4 | P1 | start process eg method to find area of trapezium |
| | | | P1 | complete process to find volume of tank |
| | | | P1 | process to find time eg volume × 1000 ÷ 300 |
| | | | P1 | process to find 85% of volume or of time |
| | | | A1 | for 36.4 or 36 mins 24 secs |
| (b) | | | C1 | explanation eg if the average rate was slower it would take more time, if the average rate was faster it would take less time |
| 9 (a) | | No with reason | C1 | partial explanation, eg 0.96 × 0.975 |
| | | | C1 | No with full explanation, eg 0.96 × 0.975 = 0.936 so only a 6.4% reduction |
| (b) | | 3.15 | P1 | complete process to find value after 2 years eg (145000 – '5800') × 2.5/100 oe or 145000 × 0.96 × 0.975 (= 135720) |
| | | | P1 | (140 000 – '135720') ÷ '135720' × 100 oe |
| | | | A1 | for 3.15 – 3.154 |

| Paper 1MA1: 3H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 10 | | 1 : 2.53 | P1 for substituting values to find surface gravity of either Earth (= 9.805..) or Jupiter (= 24.796..)<br>P1 for complete process<br>A1 for 1 : 2.528 to 2.53 |
| 11 | | $x = 4.5$<br>$y = -2.5$ | M1 for a correct process to eliminate one variable (condone one arithmetic error)<br>A1 cao for either $x$ or $y$<br>M1 (dep) for substituting found value into one of the equations or appropriate method after starting again (condone one arithmetic error)<br>A1 cao |
| 12 | | 12.2 | P1 begins process eg 150÷19.3 (= 7.77..) or 150÷8.9 (= 16.85..)<br>P1 complete process to find total volume<br>P1 complete process to find the density of the alloy<br>A1 for answer in range 12.1 to 12.2 |
| 13 | | Triangle<br>(–6, 2), (–6, –1), (–3, –1) | M1 for correct shape and the correct orientation in the wrong position or two vertices correct.<br>A1 cao |

| Paper 1MA1: 3H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 14 (a) | | histogram | C1 for 2 correct bars of different widths or at least 3 correct frequency densities<br>C1 all bars in correct proportions or 4 correct bars with axes scaled and labelled<br>C1 fully correct histogram with axes scaled and labelled |
| (b) | 81 ÷ 2 = 40.5<br>90 to 105 is 29 | 108.2 | C1 for 81 ÷ 2 = 40.5 and 11.5 ÷ 18 × 5 (= 3.19..)<br>C1 For answer in range 108 to 109 |
| 15 | | shown | C1 for $\frac{a(b+1)-a}{(b+1)^2}$ or $\frac{a(b+1)^2-a(b+1)}{(b+1)^3}$ oe<br>C1 complete chain of reasoning |
| 16 | | 18.2 | M1 for $\frac{260}{360}\times\pi\times8$ oe or $\frac{100}{360}\times\pi\times8$ oe<br>A1 for 18.1 to 18.2 |
| 17 | | proof | C1 starts proof eg $n(n+1)$ or $(n-1)\times n$<br>C1 $n(n+1) + n+1$ or $(n-1)\times n + n$<br>C1 for convincing proof including $(n+1)^2$ or $n^2$ |

| Paper 1MA1: 3H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 18 (a) | values 0, 2, 5, 9, 15, 24 | 86 | M1 for starting to find area under curve<br>M1 for method to find the area under the curve between $t = 0$ and $t = 10$ (and at least 2 areas)<br>A1 |
| (b) | | overestimate with reason | C1 for overestimate and appropriate reason linked to method eg area between trapeziums and curve also included |
| 19 | | proof<br>leading to $\frac{7}{22}$ | M1 for finding two correct recurring decimals that when subtracted would result in a terminating decimal or integer with intention to subtract eg $x = 0.31818...$, $100x = 31.81818...$<br>A1 fully correct proof |
| 20 | | $\frac{1}{4}$ | P1 starts process eg $\overrightarrow{AB} = 2\mathbf{b} - 2\mathbf{a}$<br>P1 process to find $\overrightarrow{AP}$ or $\overrightarrow{BP}$<br>P1 complete process to find $\overrightarrow{OP}$<br>A1 for $\frac{1}{4}$ oe |

| Paper 1MA1: 3H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 21 | | 10.4 | P1 starts process by using cosine rule to find $CD$ eg $(CD)^2 = 4.9^2+3.8^2 - 2\times4.9\times3.8\times\cos80$ (= 31.98..)<br>P1 uses sine rule to find angle $ACD$ or angle $ADC$ eg $\frac{\sin C}{3.8} = \frac{\sin 80}{'5.655'}$ or $\frac{\sin D}{4.9} = \frac{\sin 80}{'5.655'}$<br>P1 uses sine rule to find $BC$ or $BD$ eg $\frac{BD}{\sin 25} = \frac{'5.655'}{\sin'33.6'}$<br>P1 process to find area eg 1/2 $ab\sin C$<br>A1 for 10.4 to 10.43 |

| Paper 1MA1: 3H | | | |
|---|---|---|---|
| **Question** | **Working** | **Answer** | **Notes** |
| 22 (a) | | chain of reasoning | C1 for a relevant product eg $\frac{y}{y+5}\times\frac{5}{y+4}$<br>C1 for a correct equation eg $2\times\left(\frac{y}{y+5}\times\frac{5}{y+4}\right)=\frac{6}{11}$<br>C1 for method to eliminate fractions from algebraic expression<br>C1 complete chain of reasoning |
| (b) | | $\frac{3}{11}$ | M1 method to solve equation eg $(ax + b)(cx + d)$ with $ac = 3$ and $bd = \pm 60$<br>A1 for selecting $y = 6$<br>A1 for $\frac{3}{11}$ oe |
| 23 | | $2(x + 4)^2 + 3$<br><br>(–4, 3) | P1 process to find $a$, eg $2x^2 + 16x + 35 = 2(x^2 + \ldots)$ or $a = 2$<br>P1 for $2((x + 4)^2 + \ldots))$ or $b = 4$<br>A1 for $2(x + 4)^2 + 3$ or $a = 2$, $b = 4$, $c = 3$<br>B1 ft from answer of form $a(x + b)^2 + c$ |