Please check the examination details below before entering your candidate information

| Candidate surname | Other names |
|---|---|
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Centre Number | Candidate Number

# Pearson Edexcel Level 1/Level 2 GCSE (9–1)

**Time** 1 hour 30 minutes

**Paper reference** **1MA1/3H**

△ ▲

# Mathematics

## PAPER 3 (Calculator)
## Higher Tier

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator, Formulae Sheet (enclosed). Tracing paper may be used.

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.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **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.

## 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.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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P 6 8 7 2 5 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** Make $a$ the subject of the formula $p = 3a - 9$

.....

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

**2** Rob has been asked to divide 120 in the ratio 3 : 5

Here is his working.

$120 \div 3 = 40$ $120 \div 5 = 24$

Rob's working is not correct.

Describe what Rob has done wrong.

.....

.....

.....

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

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**3** 200 students chose one language to study.
Each student chose one language from French or Spanish or German.

Of the 200 students,

90 are boys and the rest of the students are girls
70 chose Spanish
60 of the 104 students who chose French are boys
18 girls chose German.

Work out how many boys chose Spanish.

.....

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

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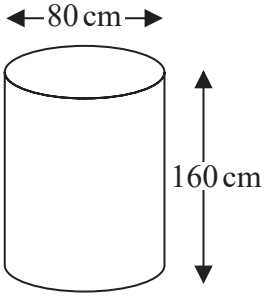
**4** Karina has 4 tanks on her tractor.
Each tank is a cylinder with diameter 80 cm and height 160 cm.




The 4 tanks are to be filled completely with a mixture of fertiliser and water.

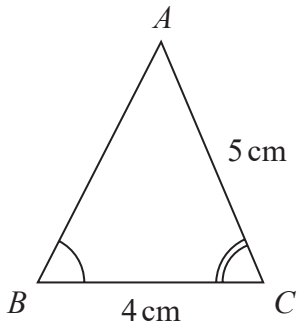
The fertiliser has to be mixed with water in the ratio 1 : 100 by volume.
Karina has 32 litres of fertiliser.

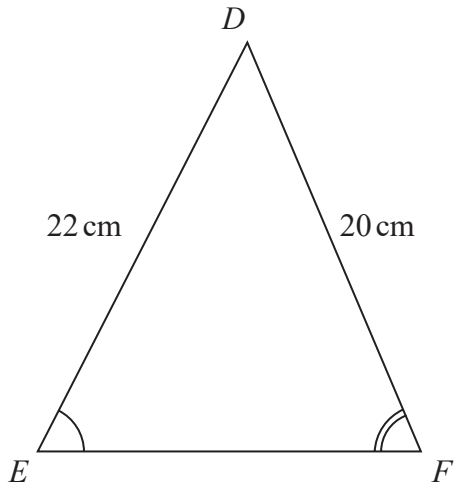
1 litre = 1000 $cm^3$

Has Karina enough fertiliser for the 4 tanks?
You must show how you get your answer.

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

**5** Triangle *ABC* and triangle *DEF* are similar.




(a) Work out the length of *EF*.

..... cm

**(2)**

(b) Work out the length of *AB*.

..... cm

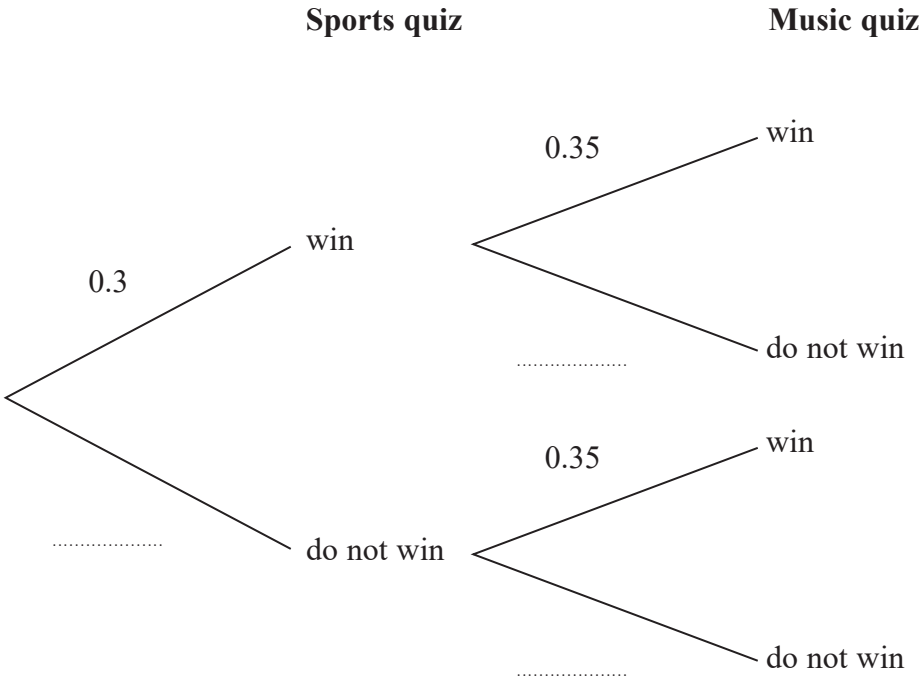
**(2)**

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

**6** One weekend the Keddie family is going to do a sports quiz and a music quiz.

The probability that the family will win the sports quiz is 0.3
The probability that the family will win the music quiz is 0.35

(a) Complete the probability tree diagram.




**(2)**

(b) Work out the probability that the Keddie family will win both the sports quiz and the music quiz.

.....

**(2)**

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

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**7** (a) Change 8000 $cm^3$ to $m^3$

..... $m^3$

**(1)**

(b) Change a speed of 180 km per hour to metres per second.

..... metres per second

**(3)**

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

**8** There are 30 women and 20 men at a gym.

The mean height of all 50 people is 167.6 cm
The mean height of the 20 men is 182 cm

Work out the mean height of the 30 women.

..... cm

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

**9** (a) Write $6.75 \times 10^{-4}$ as an ordinary number.

.....

**(1)**

(b) Work out $\dfrac{2.56 \times 10^{6} \times 4.12 \times 10^{-3}}{1.6 \times 10^{-2}}$

Give your answer in standard form.

.....

**(2)**

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

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**10** Peter has to subtract $(x^2 - 2x - 4)$ from $(x^2 + 3x + 5)$

Here is his working

$$(x^2 + 3x + 5) - (x^2 - 2x - 4)$$
$$= x^2 + 3x + 5 - x^2 - 2x - 4$$
$$= x + 1$$

Explain what is wrong with Peter's working.

.....

.....

.....

**(Total for Question 10 is 1 mark)**

**11** $x$ and $y$ are integers such that

$$3 < x < 8$$
$$4 < y < 10$$
and $x + y = 14$

Find all the possible values of $x$.

.....

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

**12** Martin used his calculator to work out the value of a number $P$.
He wrote down the first two digits of the answer on his calculator.

He wrote down 1.2

Complete the error interval for $P$.

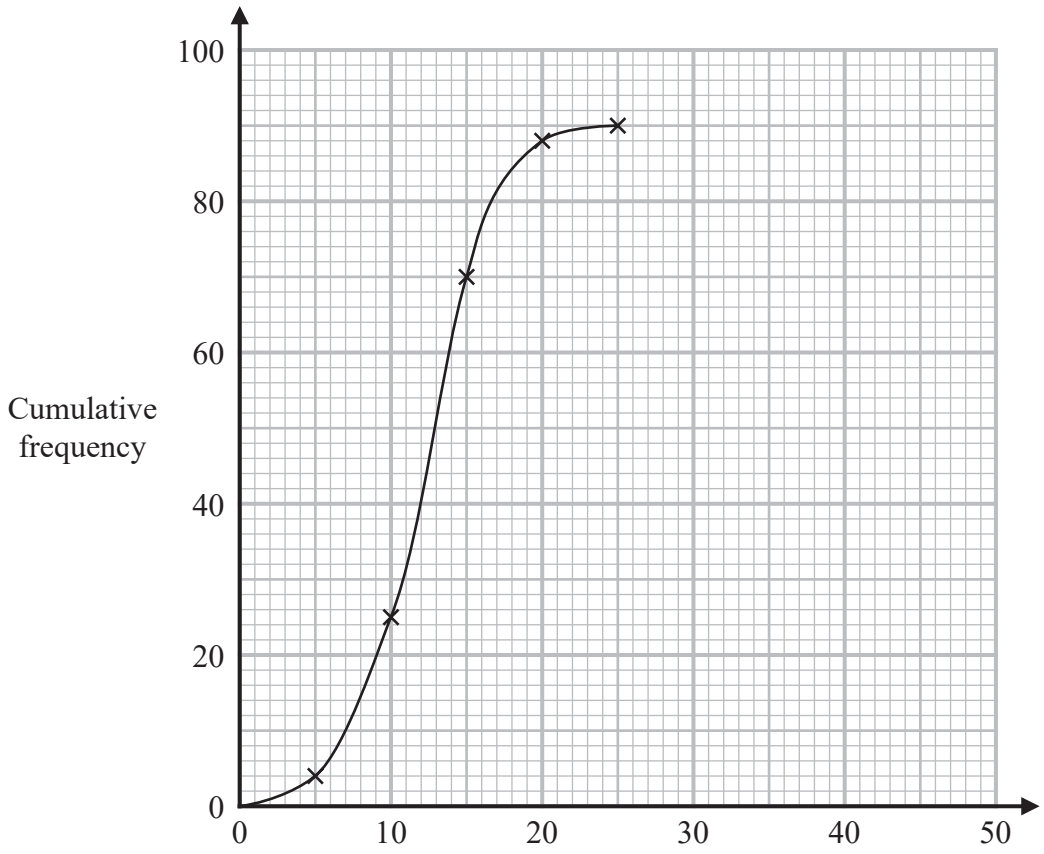
..... $\leqslant P <$ .....

**(Total for Question 12 is 2 marks)**

**13** Chen has this information about the time that it took an operator at a call centre to answer each of 90 calls.

| Time ($t$ seconds) | Cumulative frequency |
|---|---|
| $0 < t \leqslant 10$ | 4 |
| $0 < t \leqslant 20$ | 25 |
| $0 < t \leqslant 30$ | 70 |
| $0 < t \leqslant 40$ | 88 |
| $0 < t \leqslant 50$ | 90 |

Chen draws this cumulative frequency graph for the information in the table.




Write down two different things that are wrong with this graph.

1 .....

.....

2 .....

.....

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

**14** (a) Simplify fully $(3x^5y^6)^4$

.....

**(2)**

(b) Expand and simplify $(x + 2)(x - 3)(x + 4)$

.....

**(3)**

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

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**15** A pet shop has

7 guppy fish
13 tetra fish
5 angel fish.

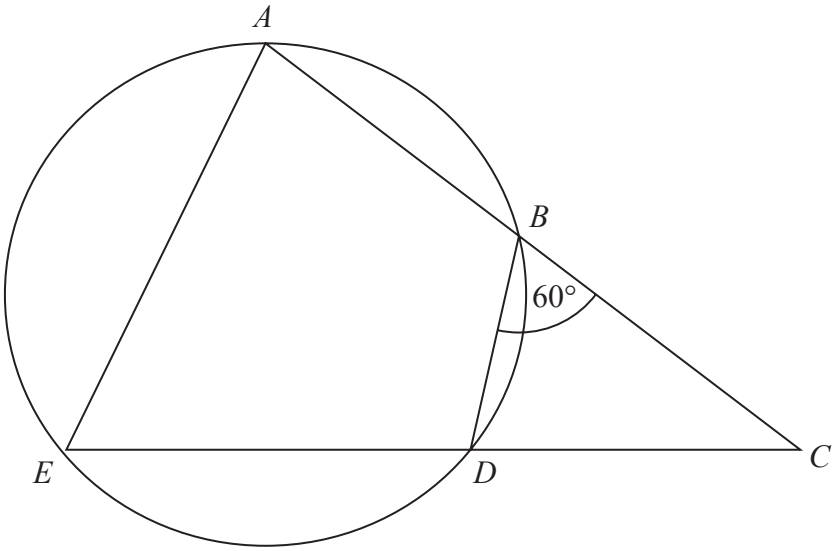
David is going to choose one of the following combinations of fish

a guppy fish and an angel fish
**or** a tetra fish and an angel fish
**or** a guppy fish, a tetra fish and an angel fish.

Show that there are 555 different ways for David to choose his fish.

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

**16**




*ABDE* is a cyclic quadrilateral.
*ABC* and *EDC* are straight lines.
Angle *DBC* = 60°

Given that

size of angle *EAB* : size of angle *BCD* = 2 : 1

work out the size of angle *BCD*.
You must show all your working.

.....°

**(Total for Question 16 is 4 marks)**

**17** There are four boxes on a shelf, **A**, **B**, **C** and **D**.

The total weight of **A** and **B** is 3 times the total weight of **C** and **D**.

The weight of **A** is $\frac{2}{3}$ of the weight of **B**.

The weight of **C** is 75% of the weight of **D**.

Find the ratio

weight of **A** : weight of **B** : weight of **C** : weight of **D**

.....

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

**18** Shape **A** is reflected in the line with equation $x = 2$ to give shape **B**.
Shape **B** is reflected in the line with equation $x = 6$ to give shape **C**.

Describe fully the **single** transformation that maps shape **A** onto shape **C**.

.....

.....

.....

**(Total for Question 18 is 2 marks)**

**19** There are only blue counters, red counters and green counters in a box.

The probability that a counter taken at random from the box will be blue is 0.4
The ratio of the number of red counters to the number of green counters is 7 : 8

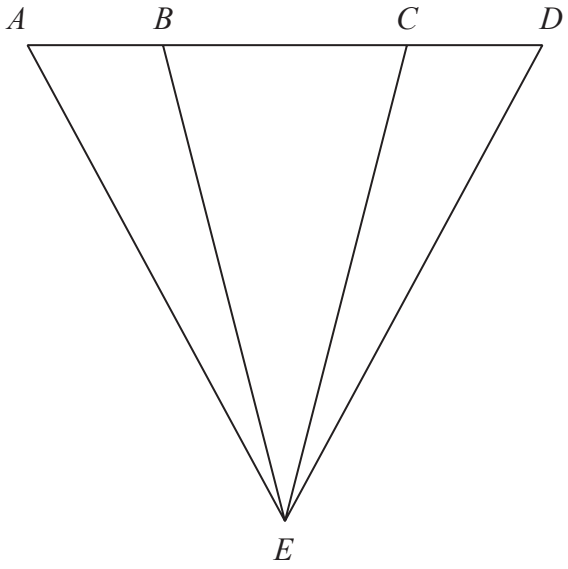
Sameena takes at random a counter from the box.
She records its colour and puts the counter back in the box.
Sameena does this a total of 50 times.

Work out an estimate for the number of times she takes a green counter.

.....

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

**20** The diagram shows a triangle $ADE$.




$AE = DE$
$AB : BC : CD = 1 : 2 : 1$

Prove that triangle $ACE$ is congruent to triangle $DBE$.

**(Total for Question 20 is 3 marks)**

**21** The equation of a curve is $y = 4x^2 - 56x$
The curve has one turning point.

By completing the square, show that the coordinates of the turning point are $(7, -196)$
You must show all your working.

**(Total for Question 21 is 3 marks)**

**22** $\dfrac{2x+3}{x-5}+\dfrac{x-4}{x+5}-3$ can be written in the form $\dfrac{ax+b}{x^2-25}$ where $a$ and $b$ are integers.

Work out the value of $a$ and the value of $b$.
You must show all your working.

$a =$ .....

$b =$ .....

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

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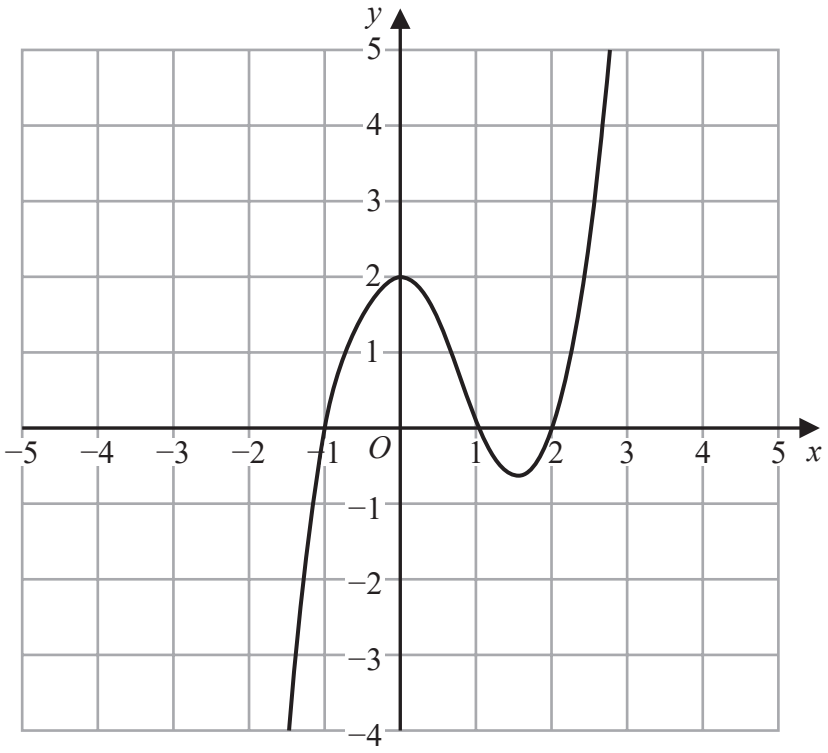
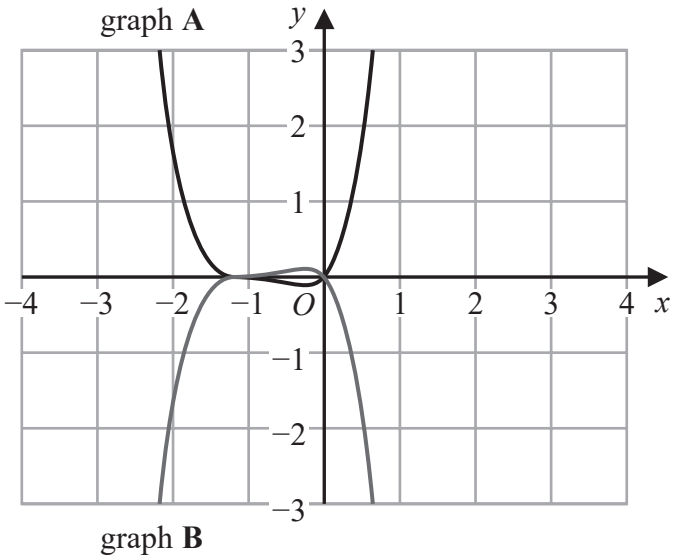
**23** The graph of $y = f(x)$ is shown on the grid below.




(a) On the grid above, sketch the graph of $y = f(x + 2)$

**(1)**




On this grid, graph **A** has been reflected to give graph **B**.
The equation of graph **A** is $y = g(x)$

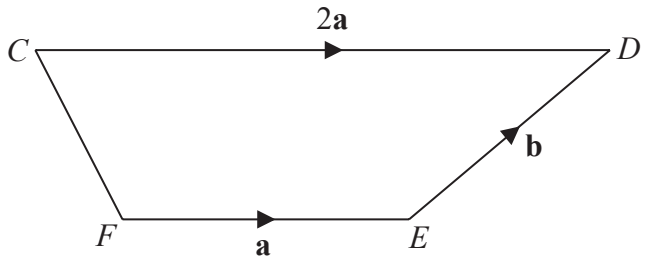
(b) Write down an equation of graph **B**.

.....

**(1)**

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

**24** *CDEF* is a quadrilateral.



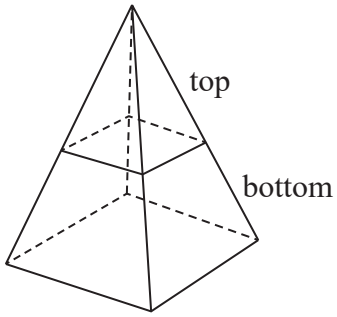

$\overrightarrow{FE} = \mathbf{a}$ $\overrightarrow{ED} = \mathbf{b}$ $\overrightarrow{CD} = 2\mathbf{a}$

The point $P$ is such that $CEP$ is a straight line and that $CE = EP$

Use a vector method to prove that $CF$ is parallel to $DP$.

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

**25** The pyramid **P** is formed from two parts made of different materials.



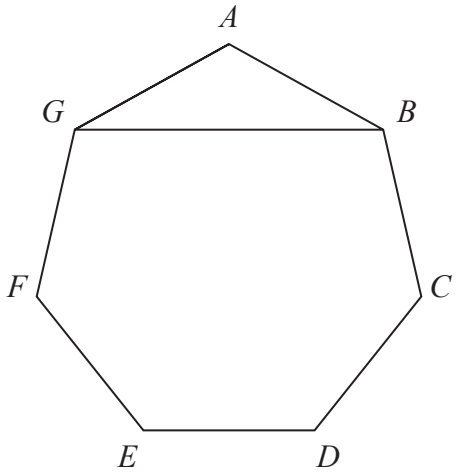

The top part of **P** has a mass of 92.8 g and is made from material with a density of 2.9 g/cm$^3$
The bottom part of **P** has a mass of 972.8 g
The average density of **P** is 4.7 g/cm$^3$

Calculate the volume of the top part of **P** as a percentage of the total volume of **P**.
Give your answer correct to 1 decimal place.
You must show all your working.

.....%

**(Total for Question 25 is 5 marks)**

**26** *ABCDEFG* is a regular heptagon.




The area of triangle *ABG* is 30 cm$^2$

Calculate the length of *GB*.
Give your answer correct to 3 significant figures.
You must show all your working.

..... cm

**(Total for Question 26 is 5 marks)**

**TOTAL FOR PAPER IS 80 MARKS**

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