Write your name here

Surname	Other Names

Mathematics

Practice Set A
Paper 2 (Calculator)
Higher Tier

Time: 1 hour 30 minutes

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 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.

1 (a) Simplify $7p^6 \times 2p^{-2}$

…….....…

(1)

(b) Simplify $(3x^5y^2)^4$

…….....…

(2)

(c) $p^2 \times p^5 = p^{11} \times p^y$

Find the value of y

…….....…

(2)

(Total for Question 1 is 5 marks)

2 (a) Find the highest common factor (HCF) of 70 and 56

.....

(2)

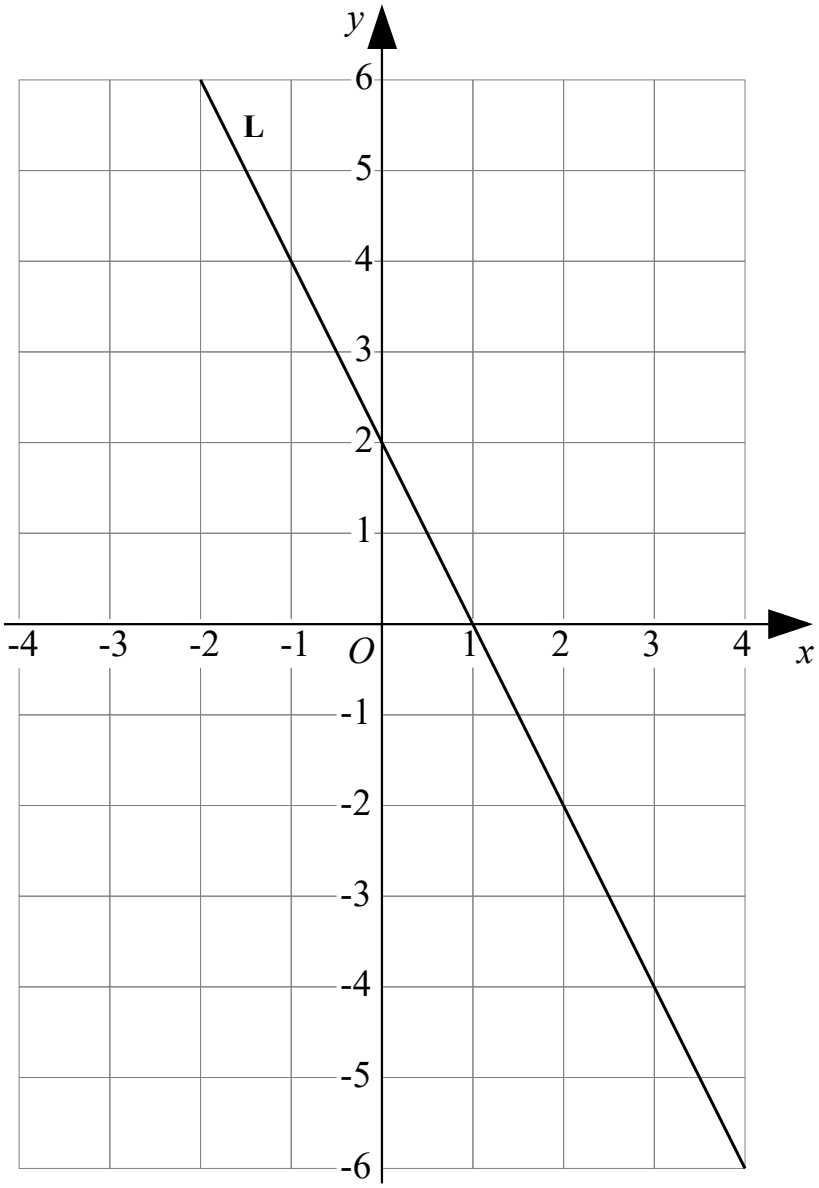
(b) Find the lowest common multiple (LCM) of 70 and 56

.....

(2)

(Total for Question 2 is 4 marks)

3



Find the equation of line **L**.

(Total for Question 3 is 3 marks)

4 Abbie buys a sofa for £680
She pays a deposit of 15% and the rest of the money in monthly payments of £17.

How many monthly payments will Abbie need to pay?

.....

(Total for Question 4 is 3 marks)

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5 There are only green pens, black pens and red pens in a box.

There are five times as many green pens as black pens.
There are half as many red pens as green pens.

Write down the ratio of green pens to black pens to red pens.

.....…

(Total for Question 5 is 2 marks)

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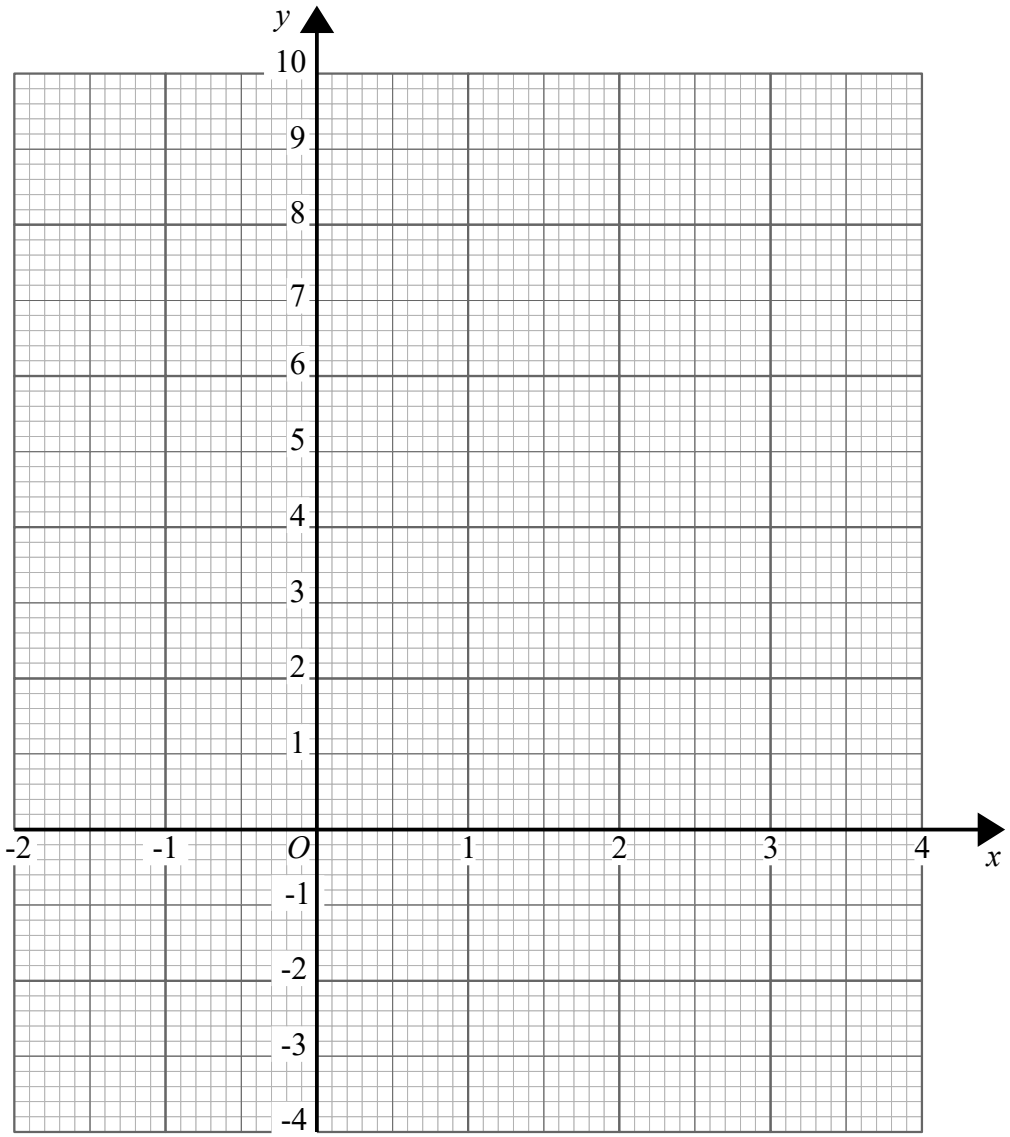
6 (a) Complete the table of values for $y = x^2 - x - 2$

x	-2	-1	0	1	2	3	4
y							

(2)



(b) On the grid draw the graph of $y = x^2 - x - 2$ for values of x from –2 to 4 (2)

(c) Use the graph to find an estimate of the turning point of the graph $y = x^2 - x - 2$

…….....…….....…….....…

(2)

(Total for Question 6 is 6 marks)

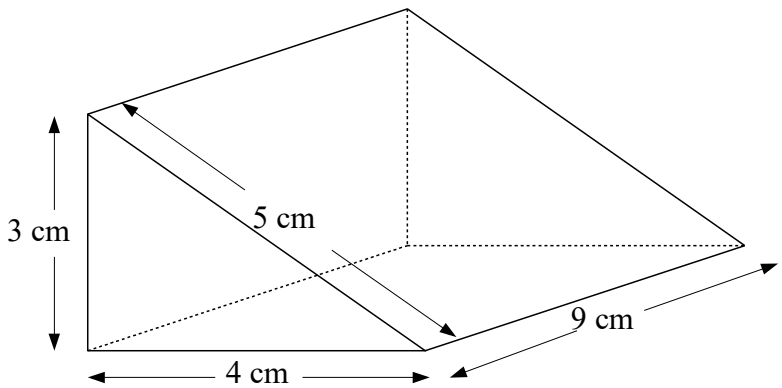
7 In 2000, the world population was 6.1 billion.
In 2020, the world population was 7.8 billion.

Work out the percentage increase in population.
Give your answer correct to 1 decimal place.

…..... %

(Total for Question 7 is 3 marks)

8



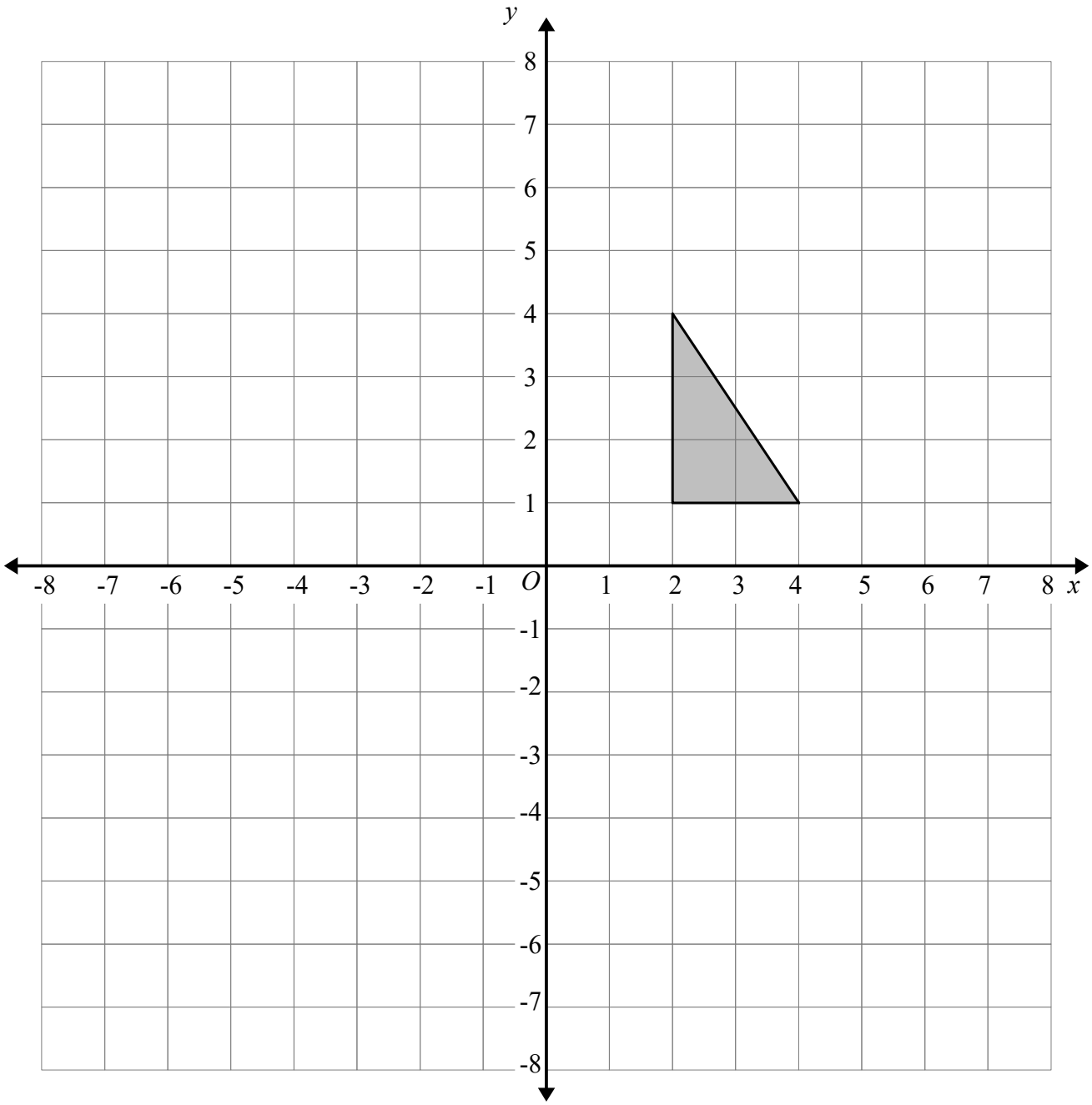
The diagram shows a triangular prism.
The cross-section of the prism is a right angled triangle.

Calculate the volume of the prism.

….....…….....cm^3

(Total for Question 8 is 3 marks)

9



On the grid, enlarge the triangle by scale factor -1.5. centre *O*.

(Total for Question 9 is 2 marks)

10 100 students in year 7 either study French or German or Spanish.

47 of the students are boys and the rest are girls.

12 boys study German.
15 boys and 16 girls study French.
A total of 32 students study Spanish.

Work out how many girls study Spanish.

….....

(Total for Question 10 is 4 marks)

11 Charlie invests £2500 for 3 years in a savings account.
She gets 3% per annum compound interest in the first year, then x% for 2 years.

Charlie has £2705.36 at the end of 3 years, work out the value of x .

….....

(Total for Question 11 is 4 marks)

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12 Given that $f(x) = x^2 - 7$ and $g(x) = 2x + 3$

(a) Work out an expression for $g^{-1}(x)$

.....

(2)

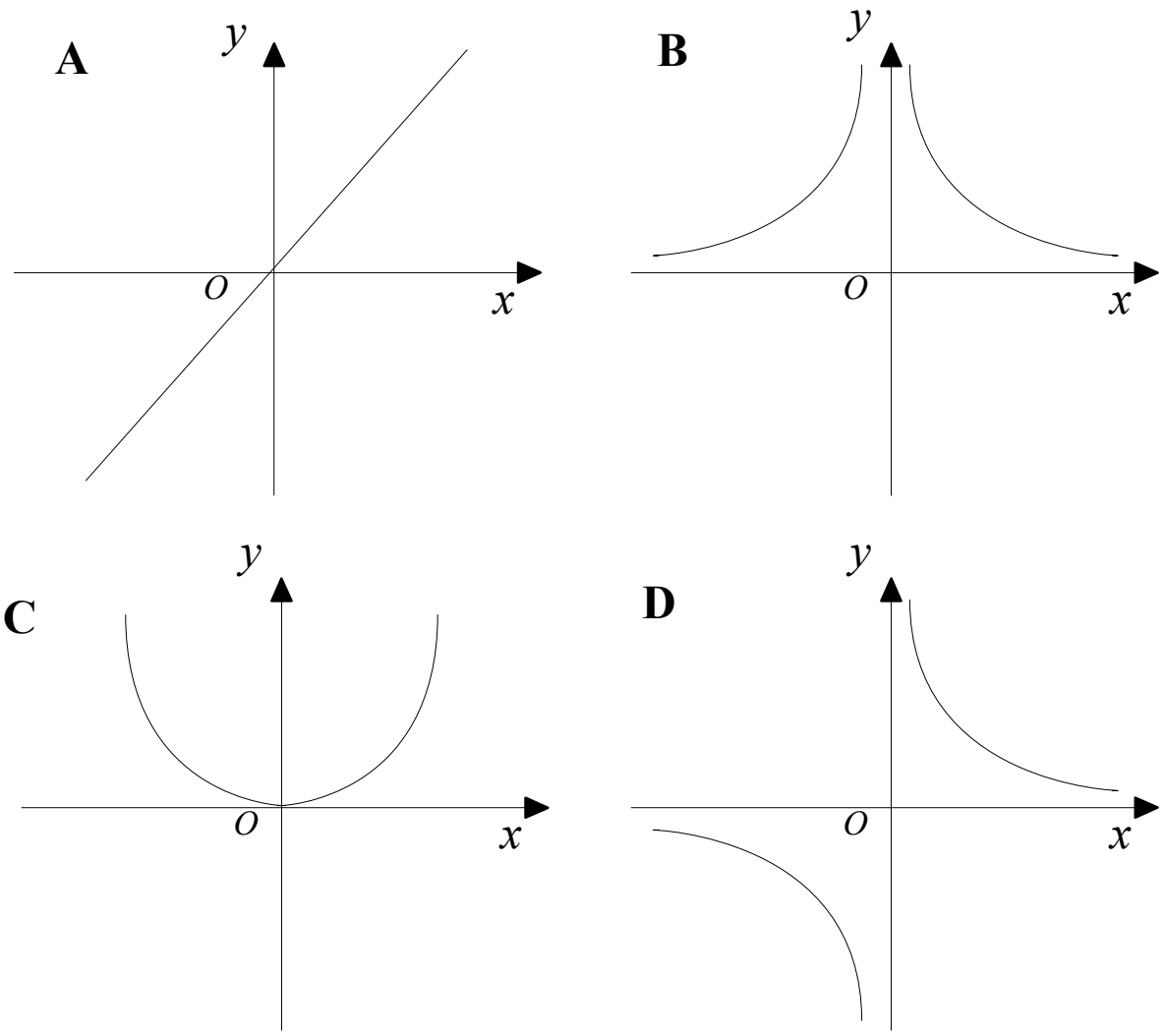
(b) Find fg(5)

.....

(2)

(Total for Question 12 is 4 marks)

13 Here are four graphs.

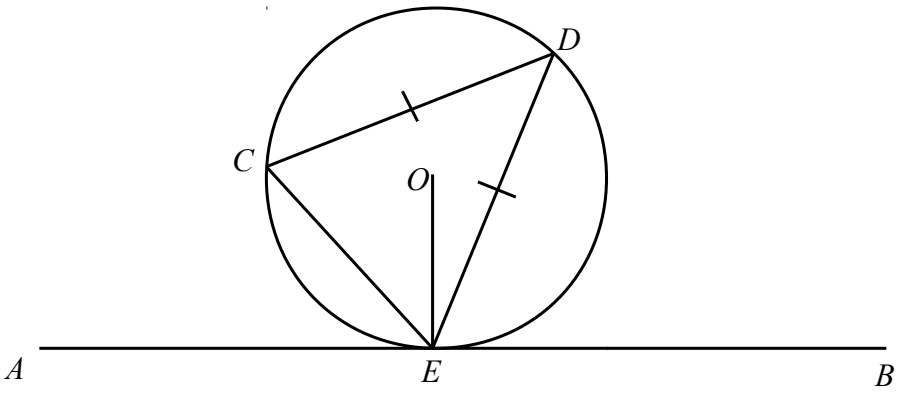


Match each graph with a statement in the table below.

Proportionality relationship	**Graph letter**
y is directly proportional to x	
y is inversely proportional to x	
y is directly proportional to x^2	
y is inversely proportional to x^2	

(Total for Question 13 is 2 marks)

14



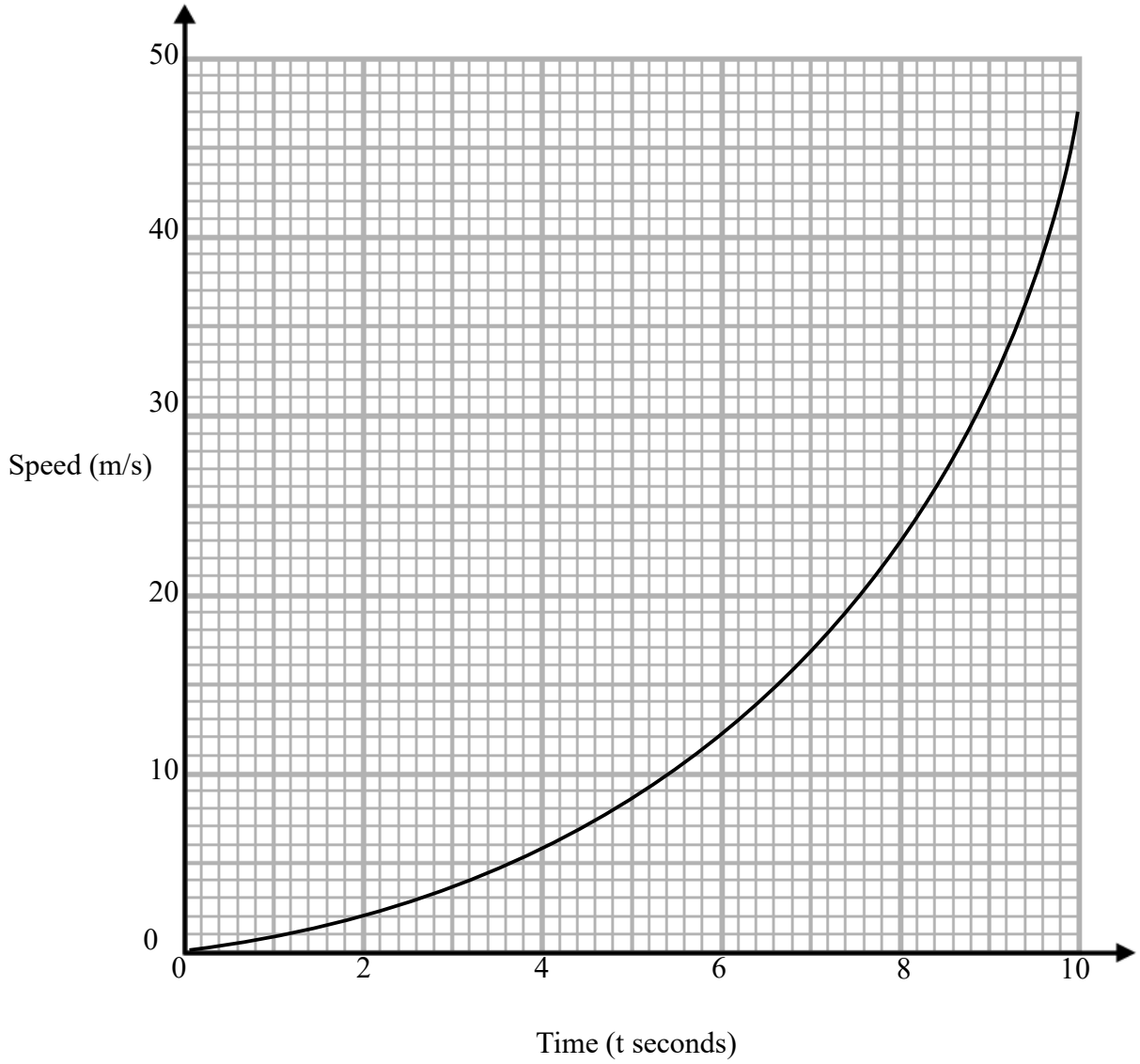
C, D and E are points on a circle, centre O.
AEB is a tangent to the circle at E.

$CD = DE$
Angle $AEC = x°$

Find the size of angle OED, in terms of x.
Give reasons for each stage of your working.

(Total for Question 14 is 5 marks)

15 Here is a speed-time graph.



(a) Work out an estimate for the acceleration when t = 4.

…..... ms^{-2}
(2)

(b) Use 5 strips of equal width to find an estimate for the distance travelled in 10 seconds.

…..... m
(2)

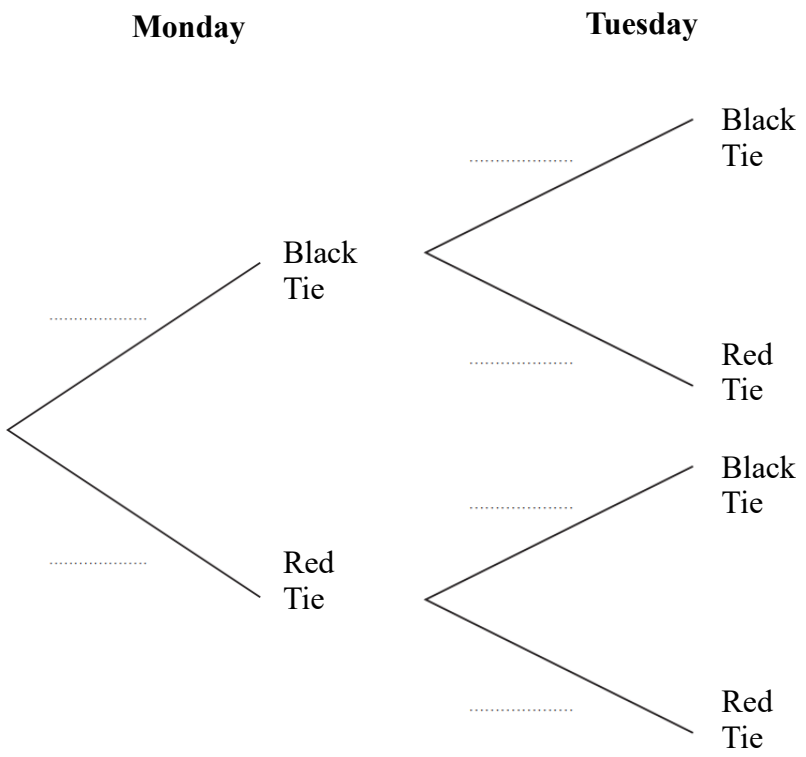
(Total for Question 15 is 4 marks)

16 Each day Paul wears either a black tie or a red tie to work.

On Monday the probability he wears a black tie is 0.72

If Paul wears a black tie on Monday, the probability that he will wear a black tie on Tuesday is 0.24
If he does **not** wear a black tie on Monday, the probability that he will wear a black tie on Tuesday is 0.8

(a) Complete the probability tree diagram.



(2)

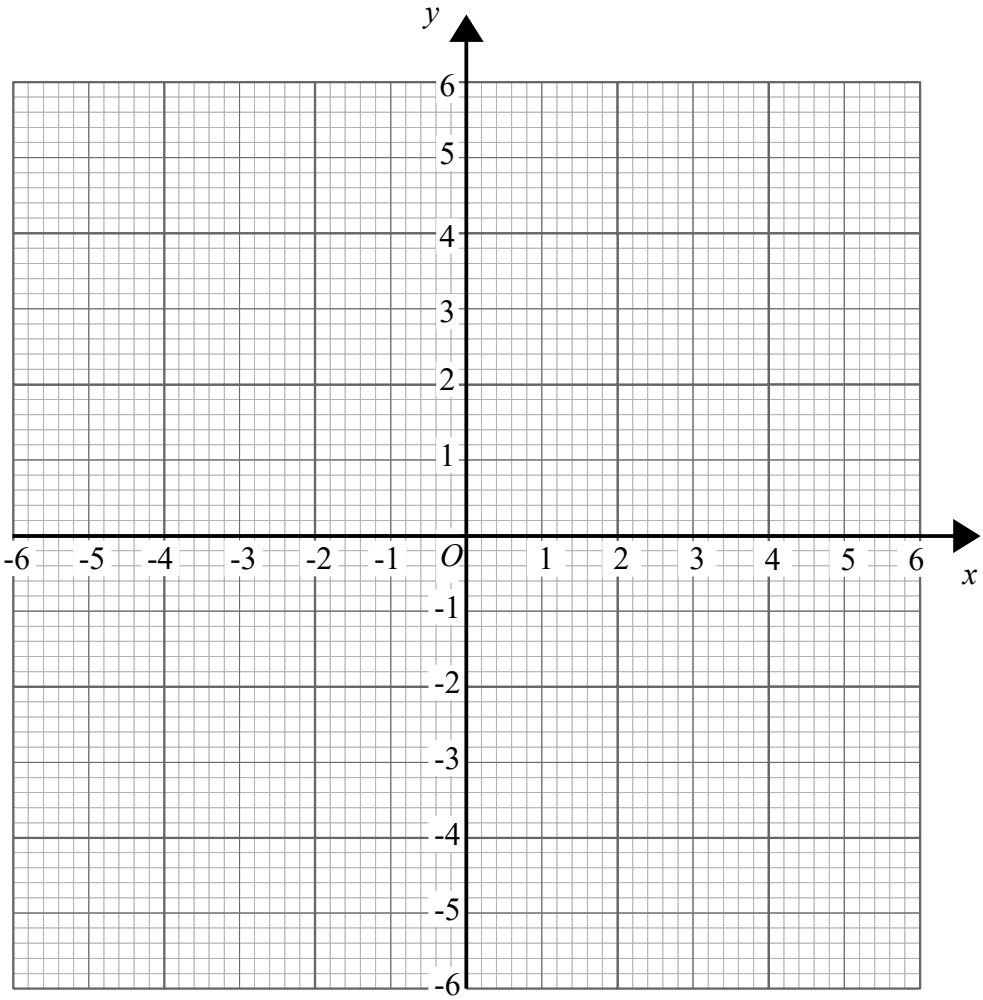
(b) Work out the probability Paul wears different coloured ties on Monday and Tuesday .

.....

(3)

(Total for Question 16 is 5 marks)

17 (a) On the grid, draw the graph of $x^2 + y^2 = 23.04$



(2)

(b) Hence find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 23.04$$
$$x + 2y = 4$$

.....

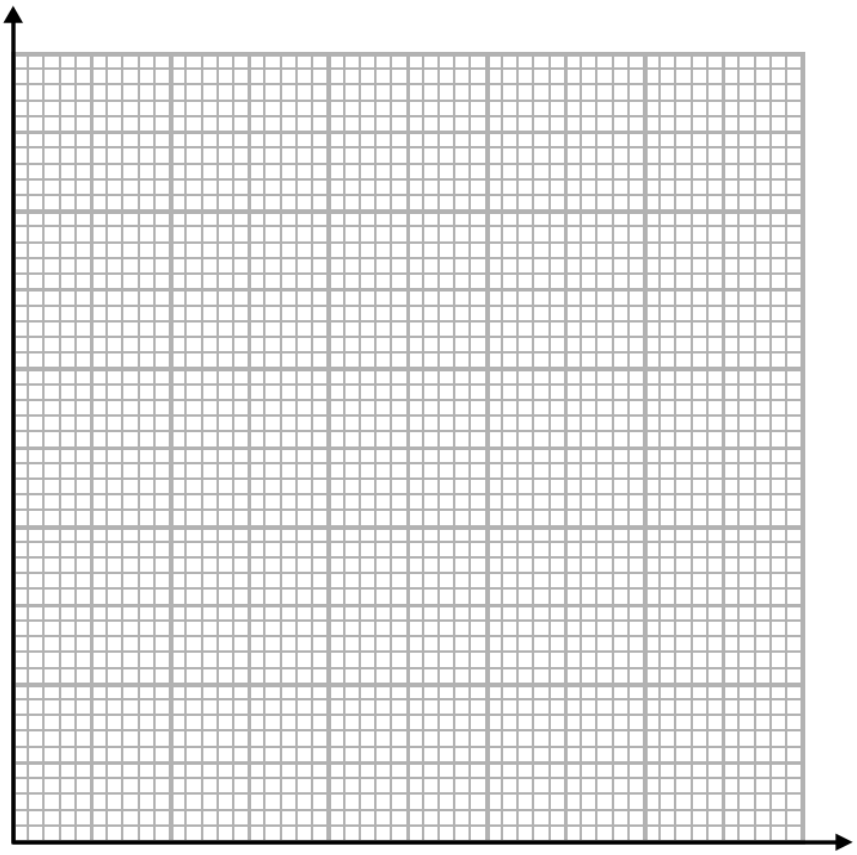
(3)

(Total for Question 17 is 5 marks)

18 The table shows information about the speed, in mph, of 120 cars.

Speed (mph)	**Frequency**
$40 < s \leqslant 55$	6
$55 < s \leqslant 60$	15
$60 < s \leqslant 65$	48
$65 < s \leqslant 75$	44
$75 < s \leqslant 90$	7

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



(3)

(b) Work out an estimate for the number of cars over 70mph.

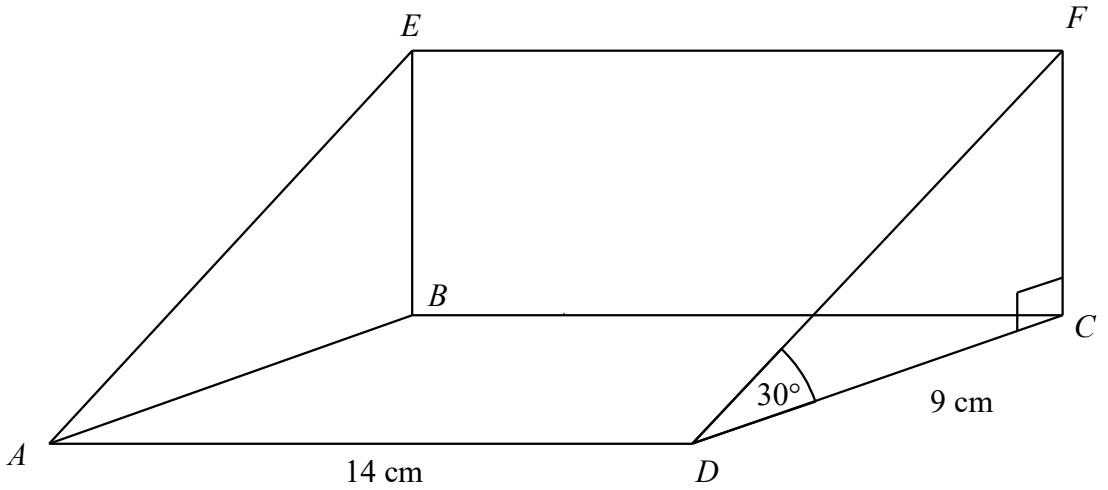
….....

(1)

(Total for Question 18 is 4 marks)

19 The diagram shows a triangular prism.

$CD = 9$ cm
$AD = 14$ cm
Angle $ADC = 30°$

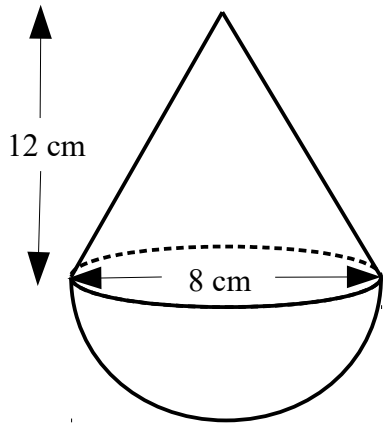


Calculate the size of angle AFC.
Give your answer correct to 1 decimal place.

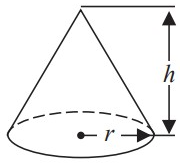
.....°

(Total for Question 19 is 4 marks)

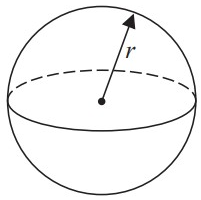
20 The diagram shows a solid shape.
The shape is a cone on top of a hemisphere.



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



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



The height of the cone is 12 cm.
The base of the cone has a diameter of 8 cm.
The diameter of the hemisphere is 8 cm.

Work out the total volume of the solid shape.
Give your answer in terms of π.

..... cm^3

(Total for Question 20 is 4 marks)

21

F = 20.1 N correct to 1 decimal places
P = 9.18 Nm^{-2} correct to 3 significant figures

$$p = \frac{F}{A}$$

p = pressure
F = force
A = area

By considering bounds, work out the value of A to a suitable degree of accuracy.
Give a reason for your answer.

.....m^2

(Total for Question 21 is 4 marks)