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**Pre Public Examination**  
GCSE Mathematics (Edexcel style)  
March 2017  
Higher Tier  
**Paper 2H**

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Name .....

Class .....

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**TIME ALLOWED**

1 hour 30 minutes

**INSTRUCTIONS TO CANDIDATES**

- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- **You are permitted to use a calculator in this paper.**
- Do all rough work in this book.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question on the Question Paper.
- **You are reminded of the need for clear presentation in your answers.**
- The total number of marks for this paper is **80**.

Question	Mark	Out of
1		4
2		2
3		2
4		4
5		5
6		3
7		5
8		3
9		7
10		6
11		3
12		4
13		4
14		4
15		4
16		6
17		4
18		5
19		5
Total		80

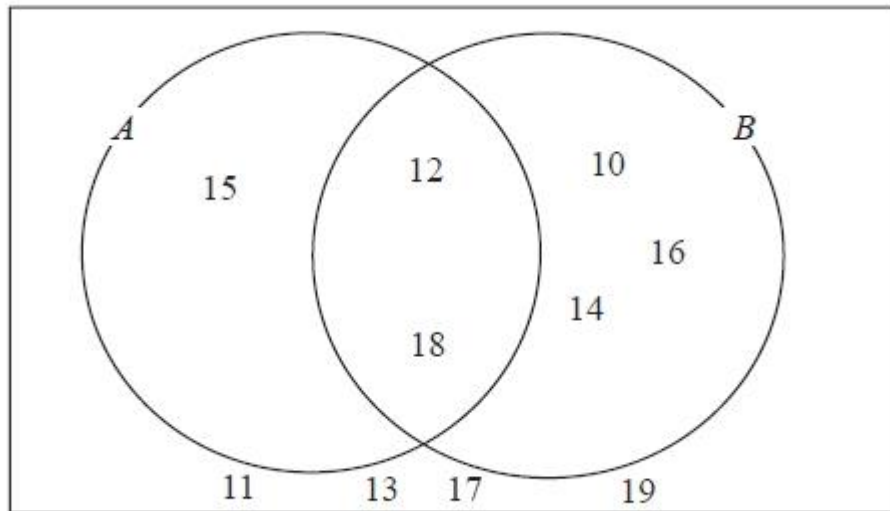
**Answer ALL questions.**

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

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

**Question 1.**

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 4 marks)**

**Question 2.**

Solve  $4n + 5 > 22$

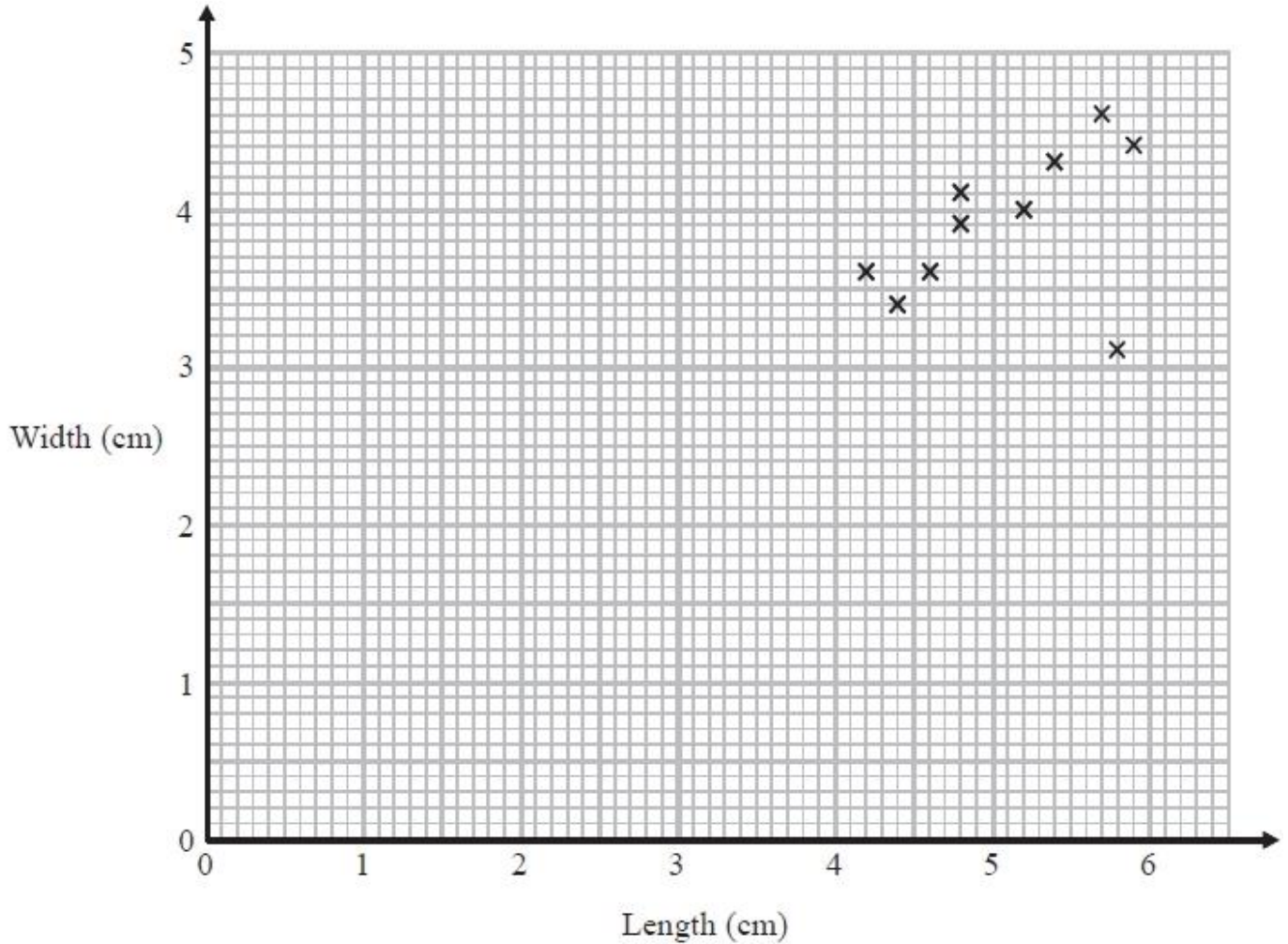
.....  
**(Total 2 marks)**

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**Question 3.**

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.

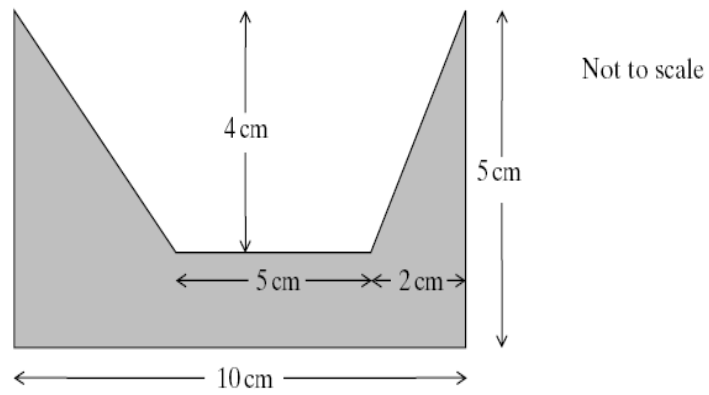
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**(1)**

**(Total 2 marks)**

**Question 4.**

A shape has dimensions as shown.



Calculate the shaded area.

.....cm<sup>2</sup>

**(Total 4 marks)**

**Question 5.**

The Singh family and the Peterson family go to the cinema.

The Singh family buy 2 adult tickets and 3 child tickets.  
They pay £28.20 for the tickets.

The Peterson family buy 3 adult tickets and 5 child tickets.  
They pay £44.75 for the tickets.

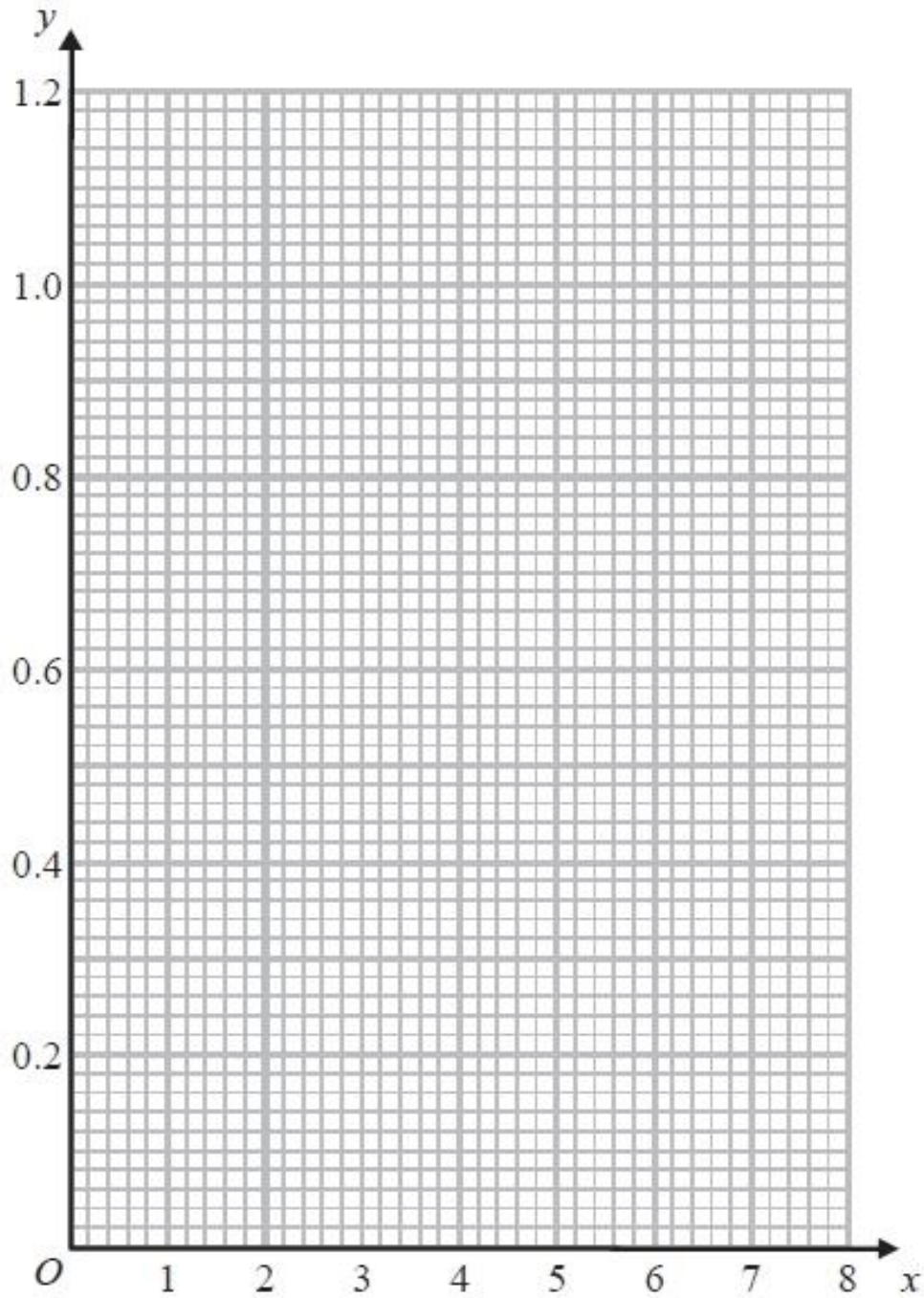
Find the cost of each adult ticket and each child ticket.

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**(Total 5 marks)**

**Question 6.**

On the grid, draw the graph of  $y = \frac{1}{x}$  for values of  $x$  from 1 to 7



**(Total 3 marks)**

**Question 7.**

Asif is going on holiday to Turkey.

The exchange rate is  $\text{£}1 = 3.5601$  lira.

Asif changes  $\text{£}550$  to lira.

- (a) Work out how many lira he should get.  
Give your answer to the nearest lira.

.....lira  
(2)

Asif sees a pair of shoes in Turkey.

The shoes cost 210 lira.

Asif does not have a calculator.

He uses  $\text{£}2 = 7$  lira to work out the approximate cost of the shoes in pounds.

- (b) Use  $\text{£}2 = 7$  lira to show that the approximate cost of the shoes is  $\text{£}60$

.....  
(2)

- (c) Is using  $\text{£}2 = 7$  lira instead of using  $\text{£}1 = 3.5601$  lira a sensible start to Asif's method to work out the cost of the shoes in pounds?

You must give a reason for your answer.

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

(1)

**(Total 5 marks)**



**Question 8.**

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
$m = 5.98 \times 10^{24}$
$r = 6.378 \times 10^6$

Jupiter
$m = 1.90 \times 10^{27}$
$r = 7.149 \times 10^7$

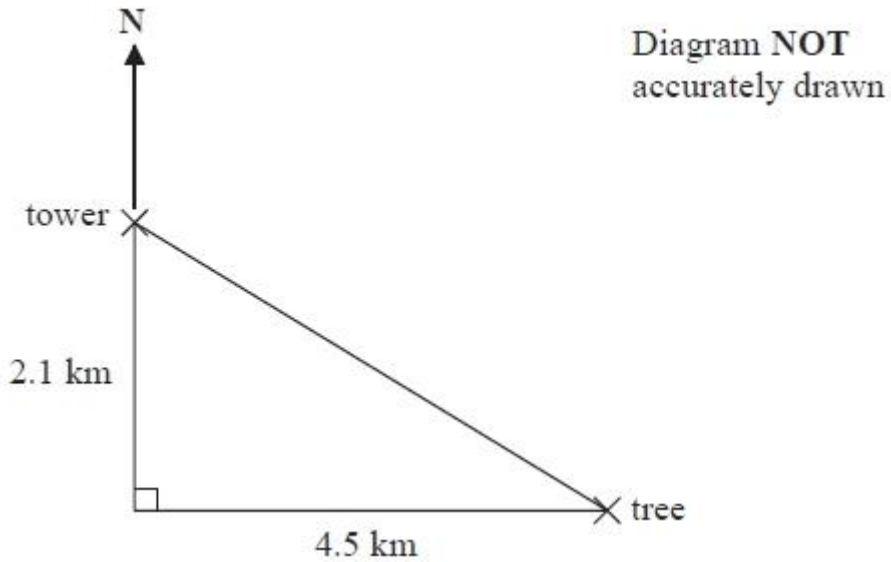
Work out the ratio of the surface gravity of Earth to the surface gravity of Jupiter.

Write your answer in the form 1:  $n$

**(Total 3 marks)**

**Question 9.**

The diagram shows the positions of a tower and a tree.



The tree is 2.1 km South of the tower and 4.5 km East of the tower.

- (a) Work out the distance between the tower and the tree.  
Give your answer correct to one decimal place.

.....km  
(3)

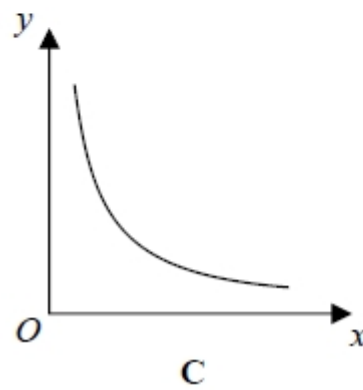
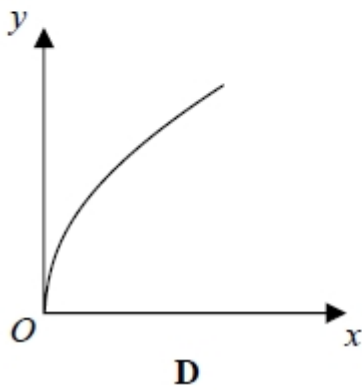
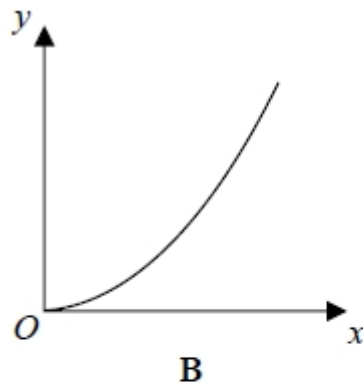
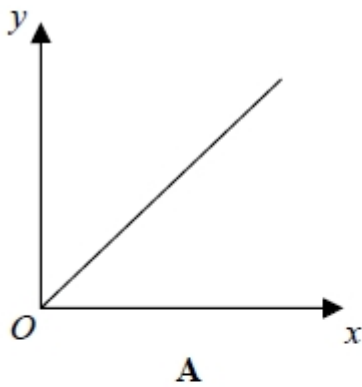
- (b) Work out the bearing of the tree from the tower.  
Give your answer correct to the nearest degree.

.....°  
(4)

**(Total 7 marks)**

**Question 10.**

Here are four graphs.



- (a) Write down the letter of the graph that could represent  
 **$y$  is proportional to  $x^2$**

.....  
**(1)**

- (b) The force of attraction,  $F$  newtons, between two magnets varies inversely as the square of the distance,  $d$ cm, between the two magnets.

- (i) What happens to the force of attraction between the magnets when the distance between the magnets is doubled?

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

When the magnets are 3 cm apart the force of attraction between them is 40 newtons.

(ii) What is the force of attraction between the magnets when they are 10 cm apart?

.....  
(5)  
(Total 6 marks)

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**Question 11.**

Here are the first 5 terms of a quadratic sequence.

2      4      8      14      22

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

(Total 3 marks)

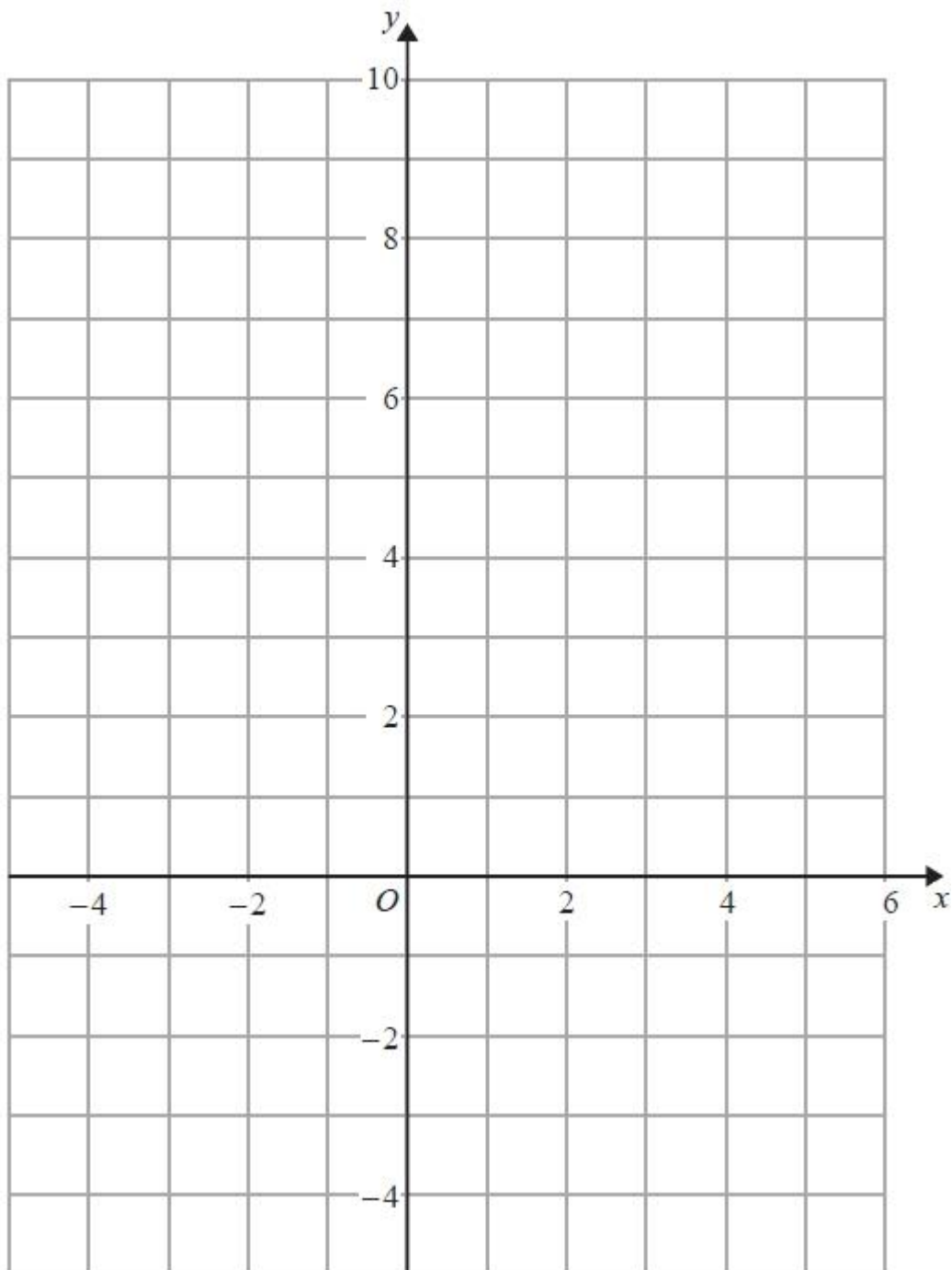
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**Question 12.**

On the grid, shade the region that satisfies all these inequalities.

$$x + y < 4 \quad y > x - 1 \quad y < 3x$$

Label the region **R**.

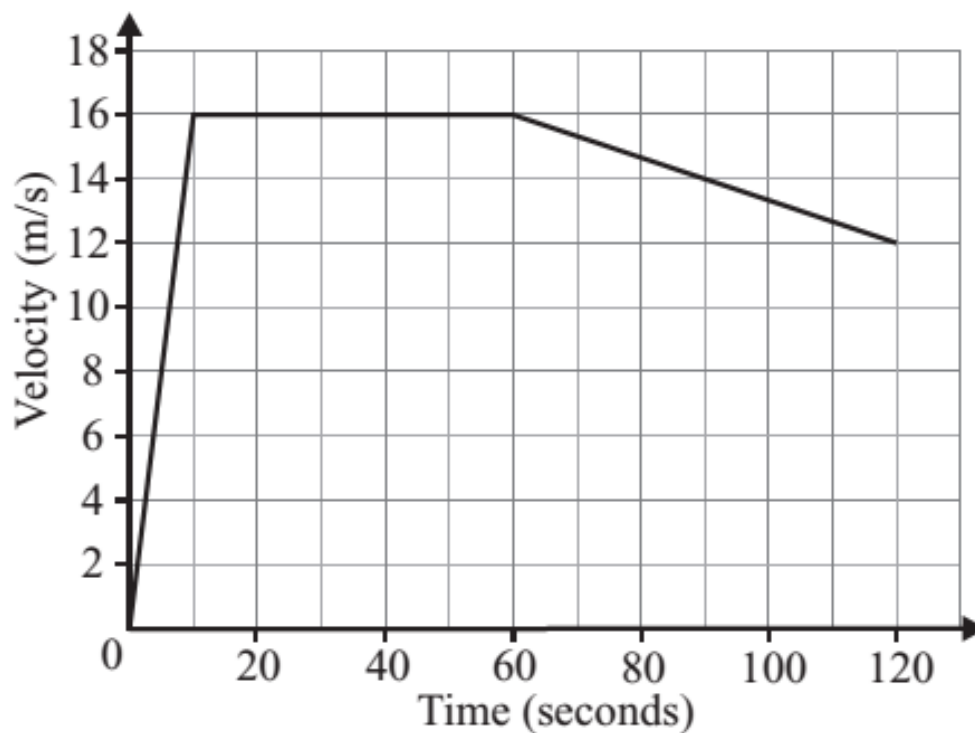


**(Total 4 marks)**

**Question 13.**

The velocity-time graph on the right shows the first two minutes of a car journey.

Calculate the distance the car travels in the first two minutes of its journey.



**(Total 4 marks)**

**Question 14.**

The points  $A(6, 1)$  and  $B(-2, 5)$  are on the line with equation  $y = -\frac{1}{2}x + 4$

$M$  is the midpoint of  $AB$ .

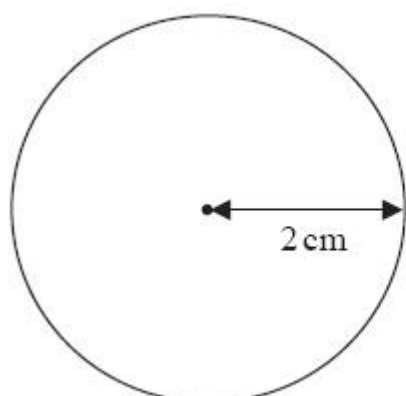
Find an equation of the line through  $M$  that is perpendicular to  $y = -\frac{1}{2}x + 4$

**(Total 4 marks)**

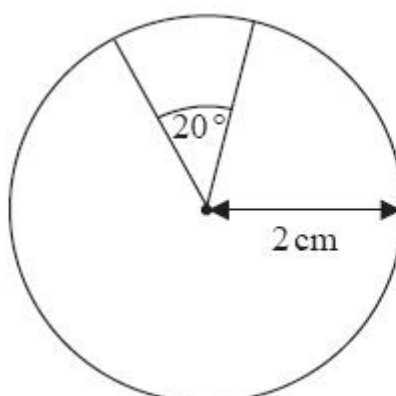
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**Question 15.**

Here are two watch faces, **A** and **B**.



face **A**



face **B**

Diagram **NOT**  
accurately drawn

Both watch faces are circular with radius 2cm.

The materials used to make both watch faces have the same thickness.

**A** is made entirely of plastic.

**B** has a  $20^\circ$  sector of metal and a  $340^\circ$  sector of plastic.

The ratio of the cost per  $\text{cm}^2$  of the metal to the cost per  $\text{cm}^2$  of the plastic is 3:2

Work out the ratio of the cost of the materials for **A** to the cost of the materials for **B**.

Give your answer in its simplest form.

You must show all your working.

(Total 4 marks)



**Question 16.**

$OACB$  is a parallelogram.

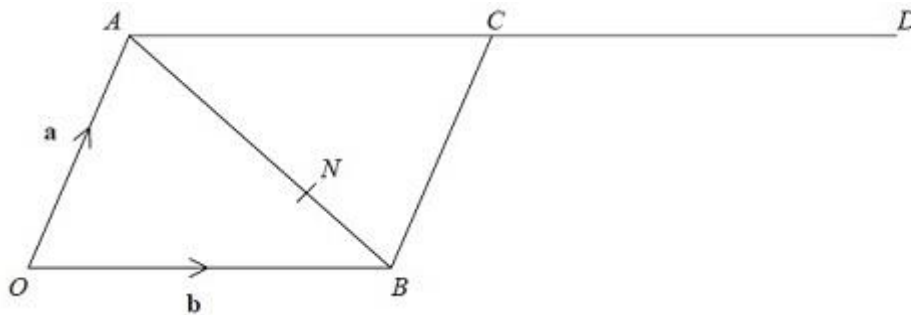


Diagram NOT  
accurately drawn

$$\vec{OA} = \mathbf{a} \text{ and } \vec{OB} = \mathbf{b}$$

$D$  is the point such that  $\vec{AC} = \vec{CD}$

The point  $N$  divides  $AB$  in the ratio 2:1

(a) Write an expression for  $\vec{ON}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

.....  
(3)

\*(b) Prove that  $OND$  is a straight line.

(3)  
(Total 6 marks)

**Question 17.**

A curve has equation  $x^2 + y^2 = 10$ . The point  $P(3, 1)$  is a point on the curve.

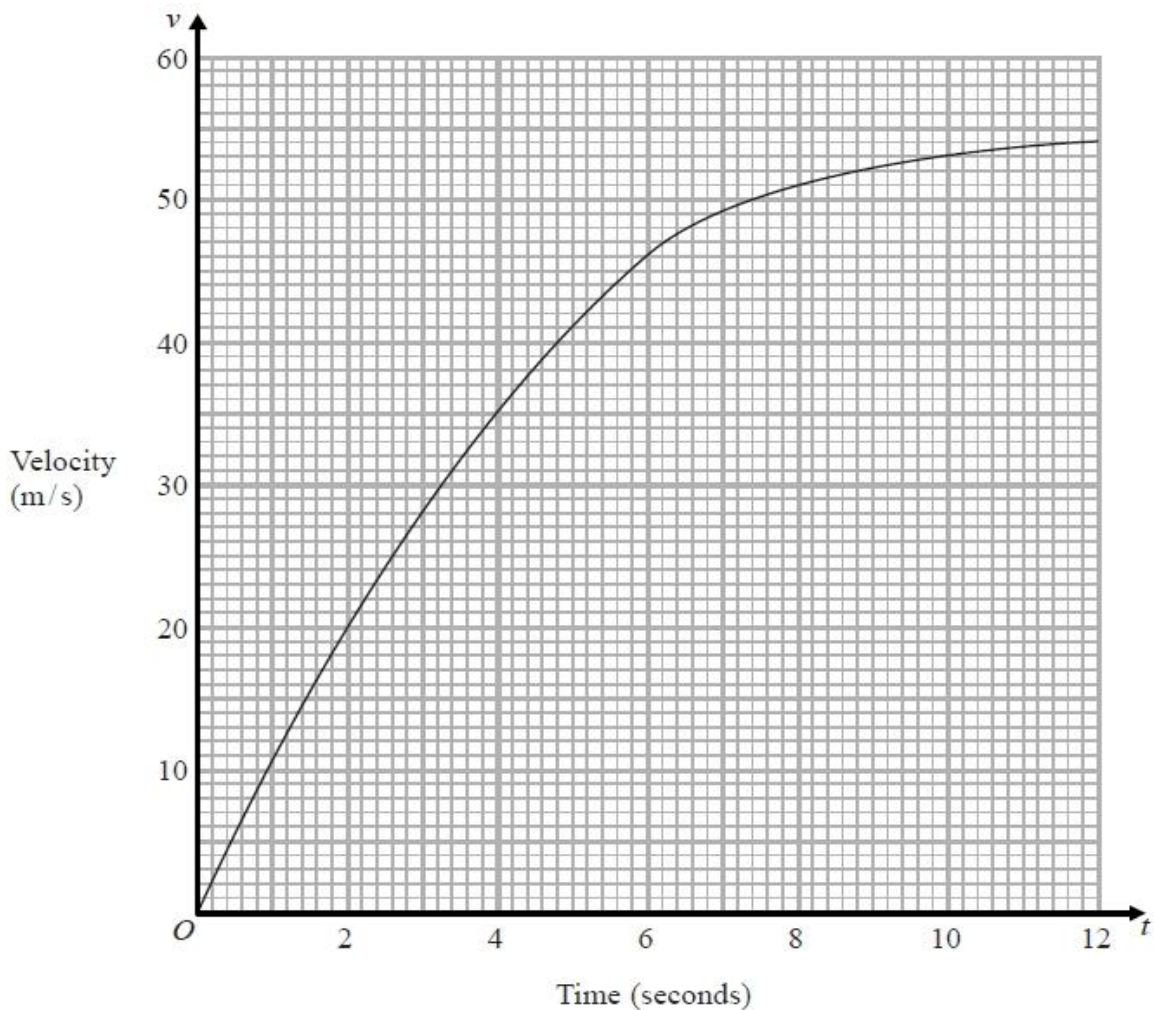
Work out the equation of the tangent to the curve at  $P$ .

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**(Total 4 marks)**

**Question 18.**

The graph shows information about the velocity,  $v$  m/s, of a parachutist  $t$  seconds after leaving a plane.



(a) Work out an estimate for the acceleration of the parachutist at  $t = 4$

..... m/s<sup>2</sup>  
(2)

(b) Work out an estimate for the distance fallen by the parachutist in the first 12 seconds after leaving the plane. Use 3 strips of equal width.

By the trapezium rule, distance is

..... m  
(3)

**(Total 5 marks)**

**Question 19.**

Hannah and Tim both think of a number.

Hannah's number is negative. Tim's number is one more than Hannah's.

They each take the reciprocal of their numbers. The sum of the reciprocals is  $\frac{5}{6}$

Use algebra to work out Hannah's original number.

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(Total 5 marks)

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**TOTAL FOR PAPER IS 80 MARKS**