

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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

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**Thursday 6 June 2019**

Morning (Time: 1 hour 30 minutes)

Paper Reference **1MA1/2H**

**Mathematics**

**Paper 2 (Calculator)**

**Higher Tier**

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

Hints



Pearson

Please note that these worked solutions have neither been provided nor approved by Pearson Education and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

Anything written in green in a cloud doesn't have to be written in the exam.

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

If you find any mistakes or have any requests or suggestions, please send an email to [curtis@cgmaths.co.uk](mailto:curtis@cgmaths.co.uk)

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Solve  $14n > 11n + 6$

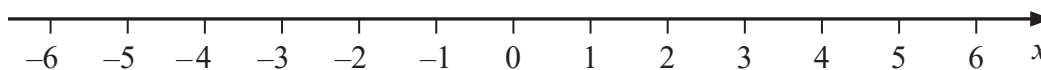
Subtract  $11n$  from both sides to get all the  $n$  terms on the same side of the equation. Then divide both sides by ? to get  $n$  on its own.

.....  
(2)

(b) On the number line below, show the set of values of  $x$  for which  $-2 < x + 3 \leq 4$

Closed circle means that the value is included in the set. Open circle means the value isn't included. A line is drawn over the values included between the circles.

Subtract 3 from all sides of the inequality to get  $x$  on its own.



(3)

(Total for Question 1 is 5 marks)

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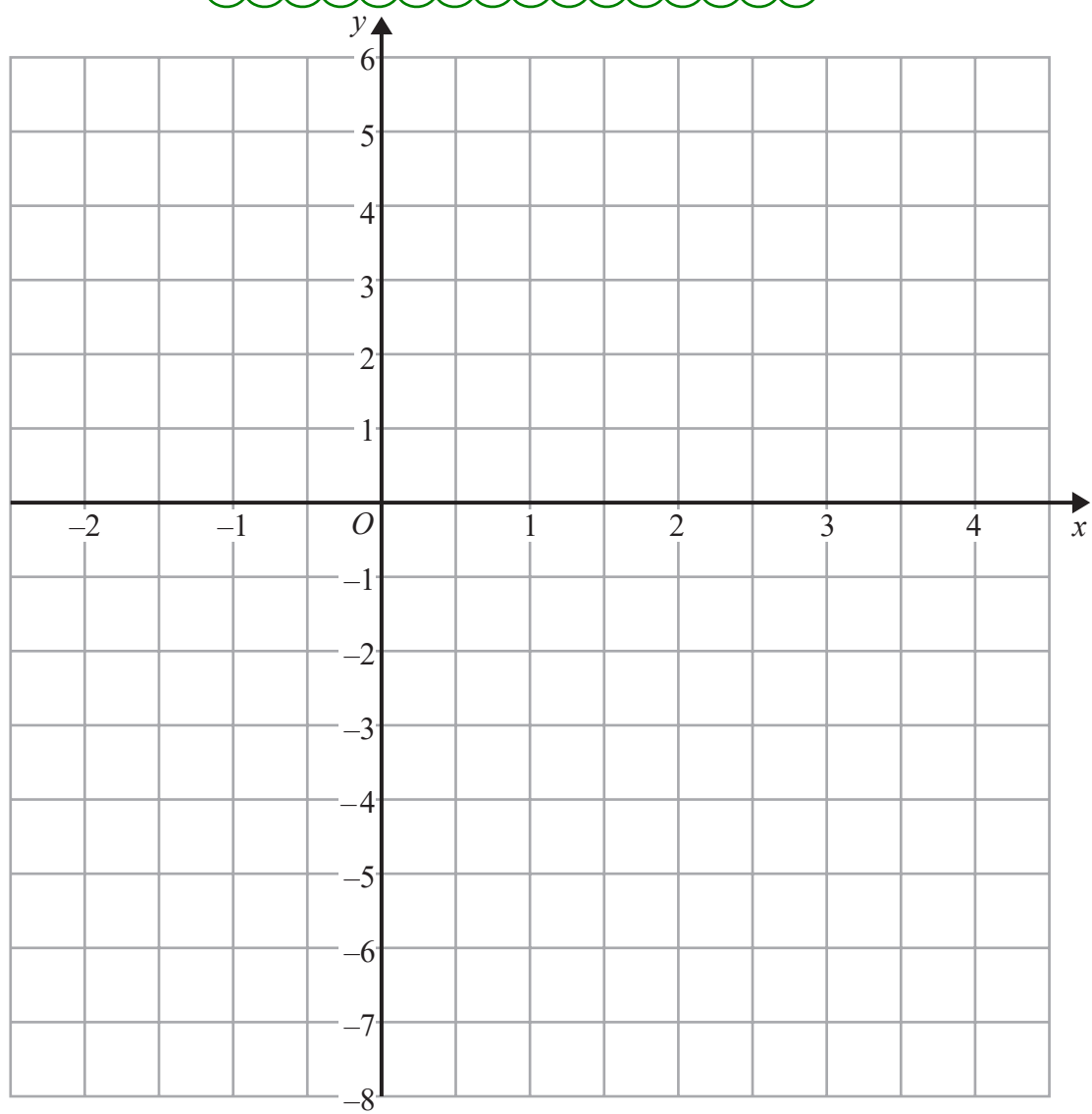
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2 On the grid below, draw the graph of  $y = 2x - 3$  for values of  $x$  from  $-2$  to  $4$

It is a linear equation (no powers of  $x$  or  $y$ ) so the line will be straight. Therefore only two points are required to draw the line.

Substitute in the highest and lowest values of  $x$  (any two values will do but this technique can possibly get a more accurate line) to find  $y$  at each of these points. Then plot them on the graph and join them with a straight line.



(Total for Question 2 is 3 marks)

3 Hannah is planning a day trip for 195 students.

She asks a sample of 30 students where they want to go.  
Each student chooses one place.

The table shows information about her results.

Place	Number of students
Theme Park	10
Theatre	5
Sports Centre	8
Seaside	7

(i) Work out how many of the 195 students you think will want to go to the Theme Park.

Calculate the fraction of the sample who chose the Theme Park then calculate this fraction of 195.

.....  
(2)

(ii) State any assumption you made **and** explain how this may affect your answer.

.....  
Does sampling 30 people make it certain that the amount calculated in part (i) will be correct?  
.....

.....  
(1)

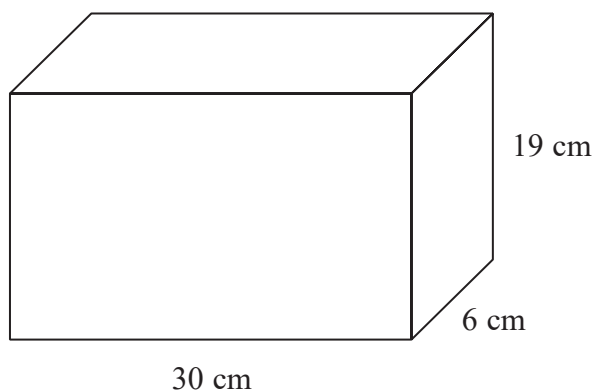
(Total for Question 3 is 3 marks)

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4 A container is in the shape of a cuboid.



The container is  $\frac{2}{3}$  full of water.

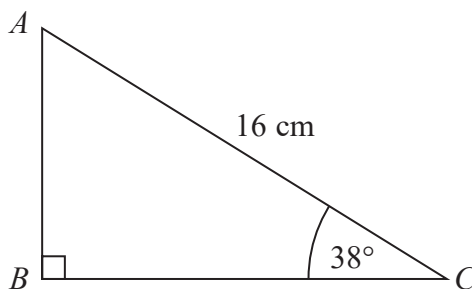
A cup holds 275 ml of water.

What is the greatest number of cups that can be completely filled with water from the container?

Work out the volume of the container.  
Volume of cuboid = length  $\times$  width  $\times$  height.  
Then calculate  $\frac{2}{3}$  of this. Calculate how many lots of 275 go into this. 1ml is  $1\text{cm}^3$ .

(Total for Question 4 is 4 marks)

5  $ABC$  is a right-angled triangle.



Calculate the length of  $AB$ .  
Give your answer correct to 2 decimal places.

There is a right angled triangle with a problem involving sides and angles so SOH CAH TOA can be used.

.....cm

(Total for Question 5 is 2 marks)

6 Sally used her calculator to work out the value of a number  $y$ .

The answer on her calculator display began

8.3

Complete the error interval for  $y$ .

The lowest possible number (lower bound).

The number must be less than this amount.

.....  $\leq y <$  .....

(Total for Question 6 is 2 marks)

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7 £360 is shared between Abby, Ben, Chloe and Denesh.

The ratio of the amount Abby gets to the amount Ben gets is 2:7

Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

If Abby gets 2 parts, Chloe and Denesh both get 1.5 times this so they both get 3 parts. Extend the ratio to include Chloe and Denesh. Calculate what 1 part is worth and then work out what Ben's parts are worth.

£.....

(Total for Question 7 is 4 marks)

8 (a) Write 0.00562 in standard form.

A decimal between 1 and 10 multiplied by a power of ten.

..... (1)

(b) Write  $1.452 \times 10^3$  as an ordinary number.

Multiply 1.452 by 10 3 times.

..... (1)

(Total for Question 8 is 2 marks)



9 The circumference of circle **B** is 90% of the circumference of circle **A**.

(a) Find the ratio of the area of circle **A** to the area of circle **B**.

$$2\pi r = c$$

$$r = \frac{c}{2\pi}$$

$r$  is the radius and  $c$  is the circumference. This verifies that if the circumference is 90%, the radius will be 90% as  $2\pi$  is constant.

Make a ratio of the radius of A to B.  
Consider that the radius is squared when finding the area of a circle.

.....  
(2)

Square **E** has sides of length  $e$  cm.

Square **F** has sides of length  $f$  cm.

The area of square **E** is 44% greater than the area of square **F**.

(b) Work out the ratio  $e:f$

Make a ratio of the area of E to F.  
Consider that the area is square rooted when finding the length of a square.

.....  
(2)

(Total for Question 9 is 4 marks)

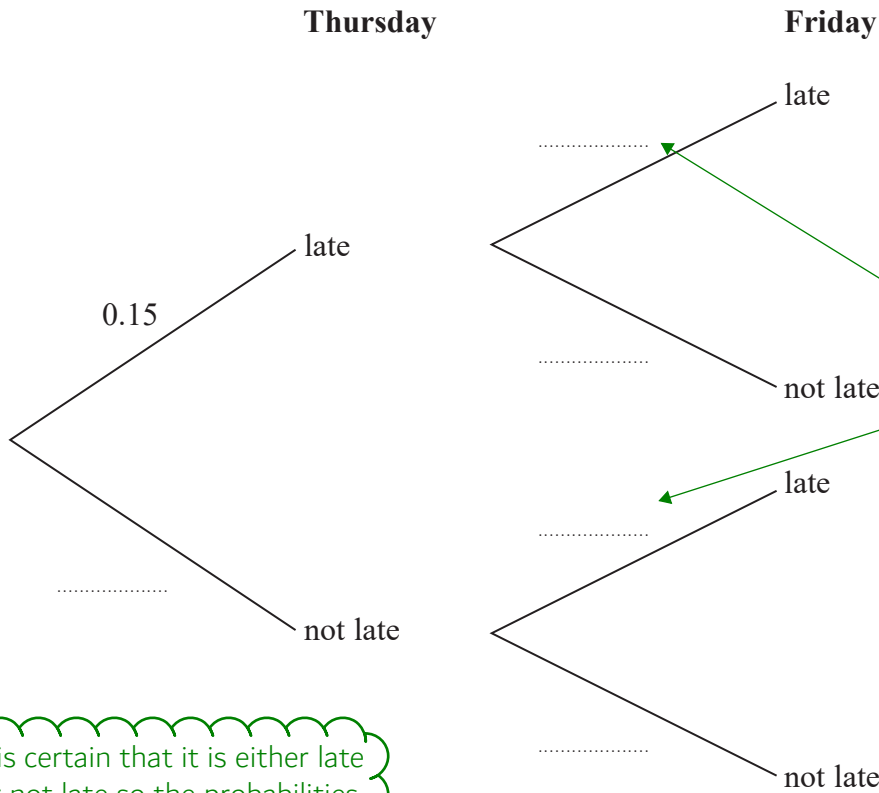
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10 Mary travels to work by train every day.  
The probability that her train will be late on any day is 0.15

(a) Complete the probability tree diagram for Thursday and Friday.



It is certain that it is either late or not late so the probabilities for each branch add up to 1.

The probability that her train will be late on any day is 0.15

(2)

(b) Work out the probability that her train will be late on at least one of these two days.

Subtracting the probability of the train not being late on both days from 1 leaves the probability it is late on at least one of the days. Multiply the probabilities of two events together to work out the probability of both of them happening.

.....  
(3)

(Total for Question 10 is 5 marks)

- 11 The grouped frequency table gives information about the times, in minutes, that 80 office workers take to get to work.

Time ( $t$ minutes)	Frequency
$0 < t \leq 20$	5
$20 < t \leq 40$	30
$40 < t \leq 60$	20
$60 < t \leq 80$	15
$80 < t \leq 100$	8
$100 < t \leq 120$	2

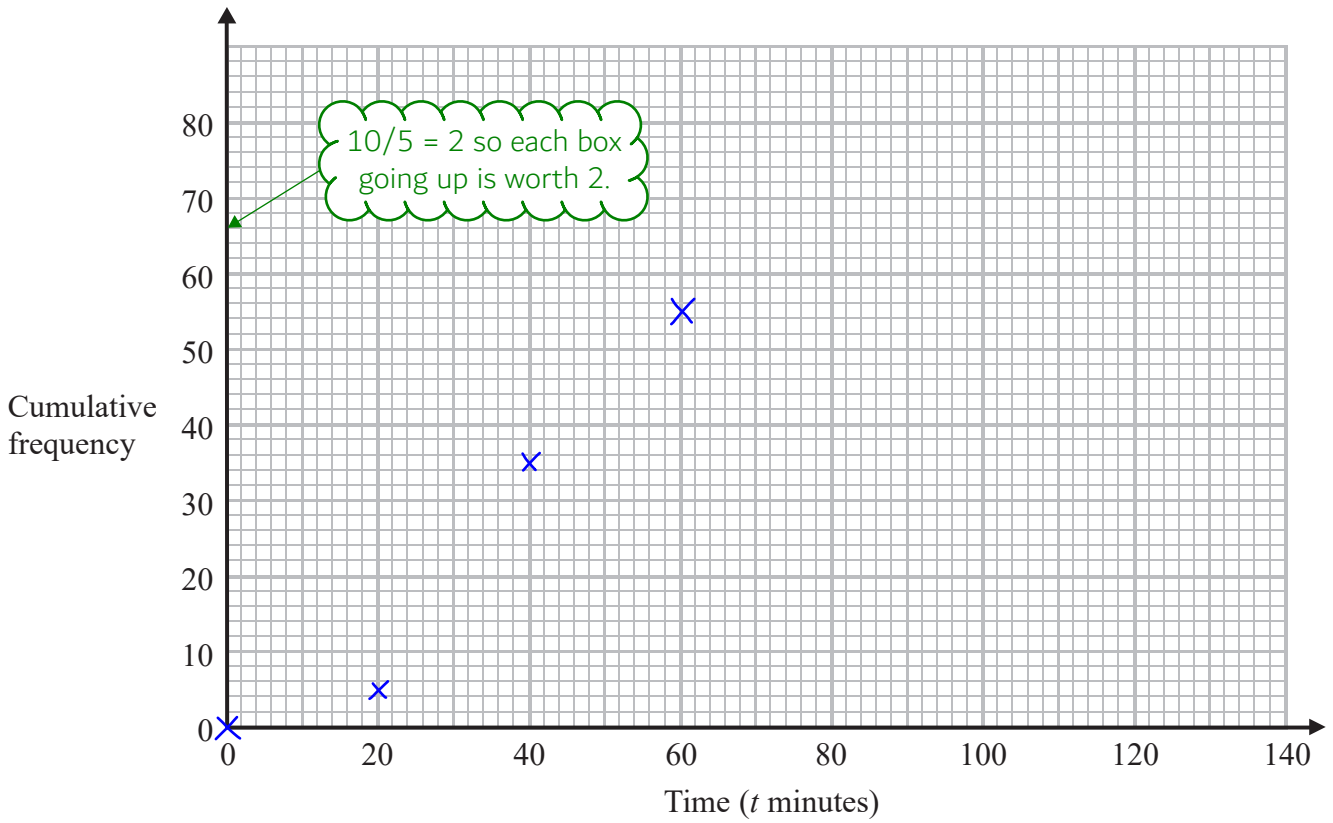
- (a) Complete the cumulative frequency table.

Time ( $t$ minutes)	Cumulative frequency
$0 < t \leq 20$	5
$0 < t \leq 40$	35 ← $5 + 30$
$0 < t \leq 60$	55 ← $35 + 20$
$0 < t \leq 80$	
$0 < t \leq 100$	
$0 < t \leq 120$	

(1)

Add up and combine the frequencies as you go down the column.

(b) On the grid, draw the cumulative frequency graph for this information.



(2)

(c) Use your graph to find an estimate for the percentage of these office workers who take more than 90 minutes to get to work.

Read off the graph how many people were later than 90 minutes. Putting this into a fraction out of the 80 people and then multiplying by 100 converts it into a percentage.

.....%

(3)

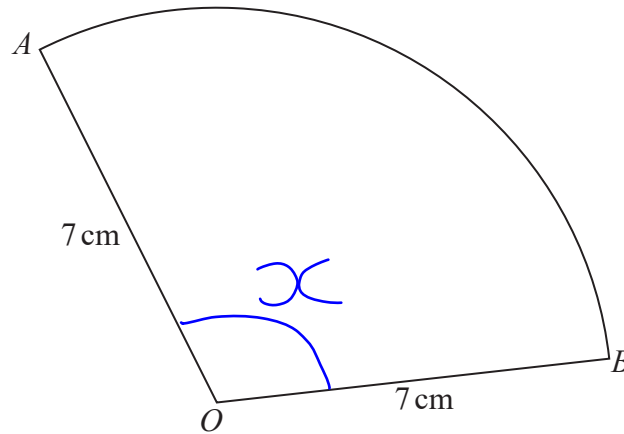
(Total for Question 11 is 6 marks)

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12  $OAB$  is a sector of a circle with centre  $O$  and radius 7 cm.



The area of the sector is  $40 \text{ cm}^2$

Calculate the perimeter of the sector.

Give your answer correct to 3 significant figures.

$$\pi \times 7^2 \times \frac{x}{360} = 40$$

$\pi r^2 =$  area of circle.  $x/360$  is the proportion of the circle which makes up the sector. The area of the sector is  $40 \text{ cm}^2$ .

Rearrange to find angle  $x$ . Calculate the circumference of the whole circle using  $2\pi r$  then multiply this by the proportion of the circle which makes up the sector. Add the length of the two radii to the arc length to get the perimeter.

..... cm

(Total for Question 12 is 4 marks)

13 Show that  $6 + \left[ (x + 5) \div \frac{x^2 + 3x - 10}{x - 1} \right]$  simplifies to  $\frac{ax - b}{cx - d}$  where  $a, b, c$  and  $d$  are integers.

Multiply by the reciprocal (flip the fraction) to divide by a fraction. Factorise the new denominator.

Cancel out the common factor from the numerator and denominator. Multiply 6 by  $\frac{x-1}{x-1}$  to make a common denominator so it can be combined with the fraction.

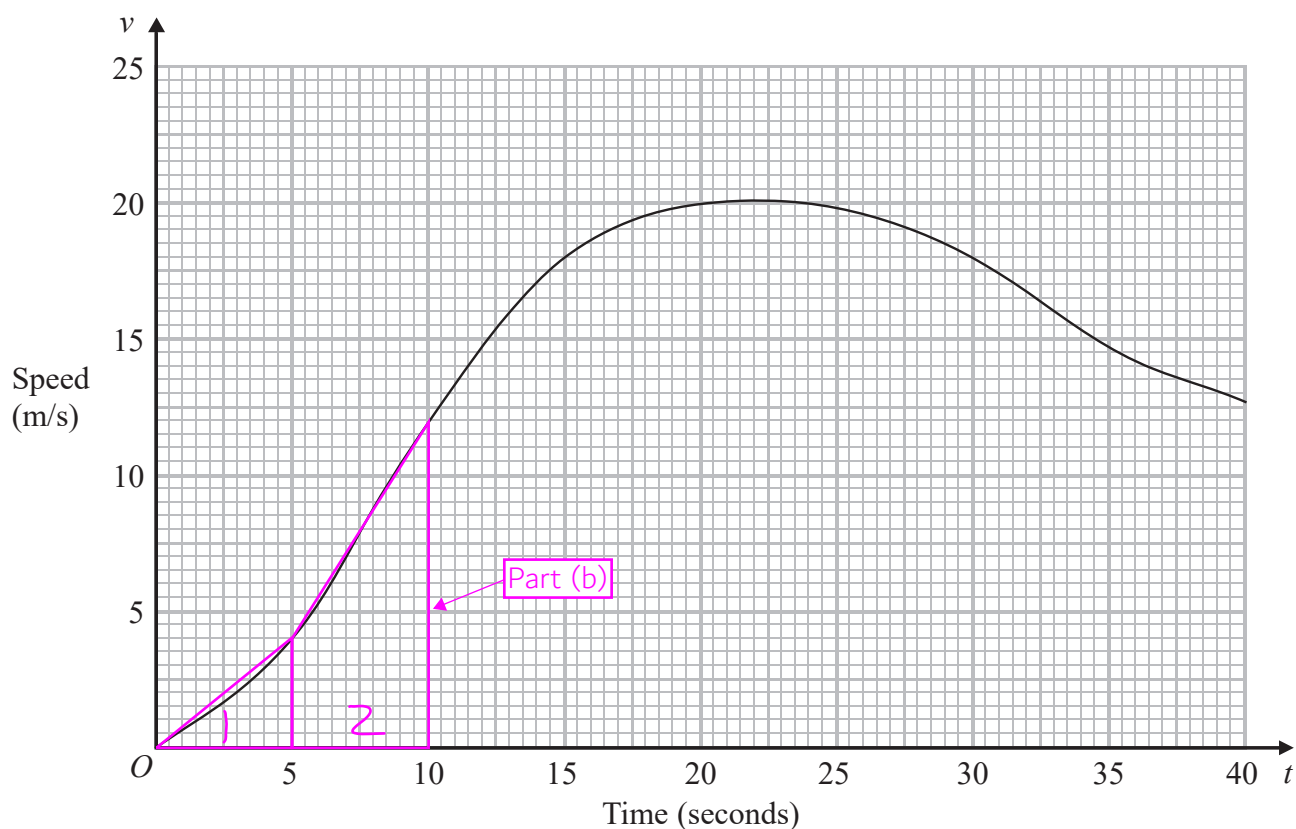
Expand out the bracket and combine the fractions.

Simplify the numerator.

(Total for Question 13 is 4 marks)

14 A car moves from rest.

The graph gives information about the speed,  $v$  metres per second, of the car  $t$  seconds after it starts to move.



(a) (i) Calculate an estimate of the gradient of the graph at  $t = 15$

Draw a tangent (a straight line which just touches the curve at a single point) to the curve where  $t = 15$ . Pick two points which are far away from each other and on grid-lines.

$$\text{Gradient} = \frac{\text{Change in } y}{\text{Change in } x}$$

.....  
(3)

(ii) Describe what your answer to part (i) represents.

.....  
The unit is  $\text{m/s}^2$

.....  
(1)

- (b) Work out an estimate for the distance the car travels in the first 20 seconds of its journey.  
Use 4 strips of equal width.

Strip 1: area of triangle =  $bh/2$   
 Strip 2: area of trapezium =  $1/2 \times (a + b)h$   
 Draw on strips 3 and 4 using the same width.  
 Add up all the areas of the strips.

.....m

(3)

**(Total for Question 14 is 7 marks)**

- 15 Make  $m$  the subject of the formula  $f = \frac{3m + 4}{m - 1}$

1. Eliminate  $m - 1$  as the denominator.  
 2. Expand any brackets this causes.  
 3. Bring all the terms involving  $m$  to one side and everything else to the other.  
 4. Bring  $m$  out as a factor then divide by the bracket to leave  $m$  on its own.

.....

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



- 16 The straight line **L** has the equation  $3y = 4x + 7$   
The point *A* has coordinates  $(3, -5)$

Find an equation of the straight line that is perpendicular to **L** and passes through *A*.

Rearrange the equation for line **L** into the form  $y = mx + c$   
where  $m$  is the gradient and  $c$  is the y-intercept.

Write the equation of the perpendicular line in the form  
 $y = mx + c$ . The gradient,  $m$ , is the negative reciprocal of the  
gradient of line **L** as the lines are perpendicular.

Rearrange the equation of the perpendicular line and  
substitute in the  $x$  and  $y$  coordinates of point *A*, which  
must satisfy the equation as it is on the perpendicular line,  
to find  $c$ .

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

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17 There are some small cubes and some large cubes in a bag.  
The cubes are red or the cubes are yellow.

The ratio of the number of small cubes to the number of large cubes is 4:7

The ratio of the number of red cubes to the number of yellow cubes is 3:5

(a) Explain why the least possible number of cubes in the bag is 88

There are 11 parts in the first ratio.

There are 8 parts in the second ratio.

(1)

All the small cubes are yellow.

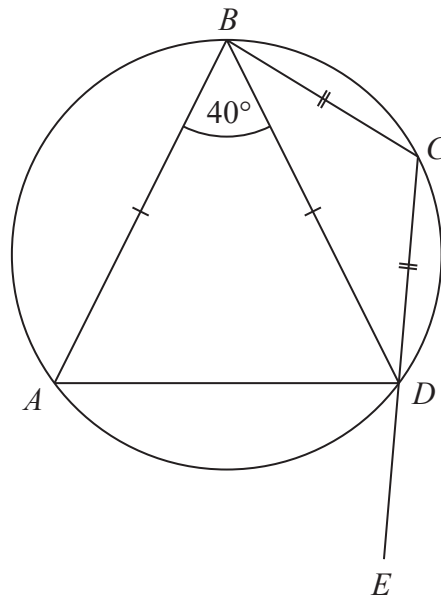
(b) Work out the least possible number of large yellow cubes in the bag.

Scale up the ratios so that they both have 88 parts in total as this is the smallest number of cubes. Subtract the number of small cubes (which is the same as the number of small yellow cubes) from the number of yellow cubes to leave us with the number of large yellow cubes.

(3)

(Total for Question 17 is 4 marks)

- 18 The points  $A$ ,  $B$ ,  $C$  and  $D$  lie on a circle.  
 $CDE$  is a straight line.



$$BA = BD$$

$$CB = CD$$

$$\text{Angle } ABD = 40^\circ$$

Work out the size of angle  $ADE$ .

You must give a reason for each stage of your working.

Angle  $ADE$  lies on a straight line with  $ADB$  and  $BDC$ . Triangles  $ADB$  and  $BDC$  are isosceles.  $ABCD$  is a cyclic quadrilateral.

(Total for Question 18 is 5 marks)

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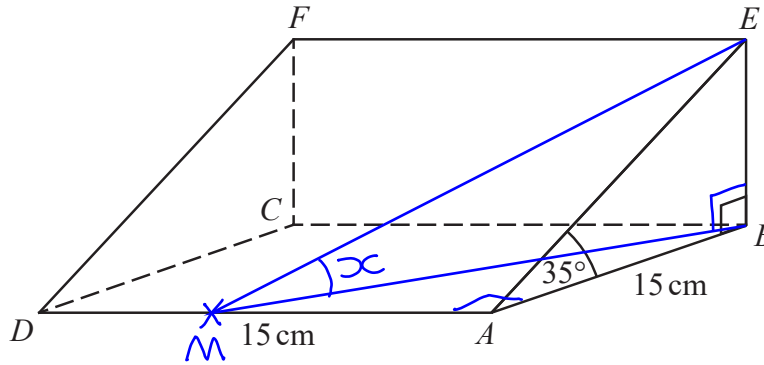
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19 The diagram shows a triangular prism.



The base,  $ABCD$ , of the prism is a square of side length 15 cm.  
 Angle  $ABE$  and angle  $CBE$  are right angles.  
 Angle  $EAB = 35^\circ$

$M$  is the point on  $DA$  such that

$$DM:MA = 2:3$$

Calculate the size of the angle between  $EM$  and the base of the prism.  
 Give your answer correct to 1 decimal place.

We are trying to find angle  $x$ , which lies on triangle  $MEB$ . It is a right angled triangle so trigonometry (SOH CAH TOA) can be used to find it if sides  $EB$  and  $MB$  are found.

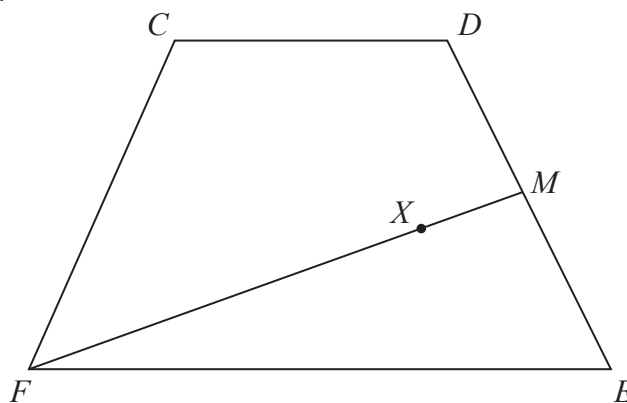
$EB$  lies on a right angled triangle  $EAB$  so can be found with trigonometry (SOH CAH TOA).

$MB$  lies on a right angled triangle  $MBA$  and can be found using Pythagoras' Theorem once  $MA$  has been found.

$MA$  can be found using the ratio.

(Total for Question 19 is 4 marks)

20  $CDEF$  is a quadrilateral.



$$\vec{CD} = \mathbf{a}, \vec{DE} = \mathbf{b} \text{ and } \vec{FC} = \mathbf{a} - \mathbf{b}.$$

- (a) Express  $\vec{FE}$  in terms of  $\mathbf{a}$  and/or  $\mathbf{b}$ .  
Give your answer in its simplest form.

$$\vec{FE} = \vec{FC} + \vec{CD} + \vec{DE}$$

(2)

$M$  is the midpoint of  $DE$ .

$X$  is the point on  $FM$  such that  $FX:XM = n:1$

$CXE$  is a straight line.

- (b) Work out the value of  $n$ .

$$\vec{CE} = \mathbf{a} + \mathbf{b} \quad \vec{CE} = \vec{CD} + \vec{DE}$$

$$\vec{CX} = \mathbf{b} - \mathbf{a} + \frac{n}{n+1} \left( 2\mathbf{a} - \frac{1}{2}\mathbf{b} \right)$$

$$\begin{aligned} \vec{CX} &= \vec{CF} + \vec{FX} \\ \vec{CF} &= -\vec{FC} \\ \vec{FX} &\text{ is a fraction of } \vec{FM} \\ \vec{FM} &= \vec{FE} + \vec{EM} \\ \vec{EM} &= -\vec{ME} \end{aligned}$$

The fraction is  $n/(n+1)$  and is found from the ratio.

Simplify into the form  $xa + yb$  where  $x$  and  $y$  are expressions involving  $n$ .  $x = y$  in order for  $\vec{CX}$  to be part of the straight line  $\vec{CE}$ . Rearrange and simplify to find  $n$ .

$$n = \dots\dots\dots$$

(4)

(Total for Question 20 is 6 marks)

TOTAL FOR PAPER IS 80 MARKS