Please check the examination details below before entering your candidate information

Candidate surname	Other names
LJH	WS

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

Centre Number | Candidate Number

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 π button, take the value of π 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 ▶

P54214A

6/6/1/1/1/1/1/

P 5 4 2 1 4 A 0 1 2 0

Pearson

MW 139

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

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

$3n > 6$ E 3

$n > 2$ M1 A1

(n=2 scores M1 A0)

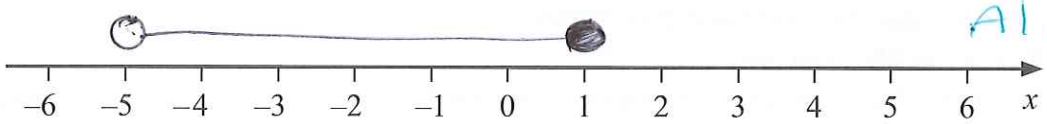
.....

(2)

(b) On the number line below, show the set of values of x for which $-2 < x + 3 \leqslant 4$ E3

$-5 < x \leq 1$

M1



A1 cao

M1 line from -5 to 1

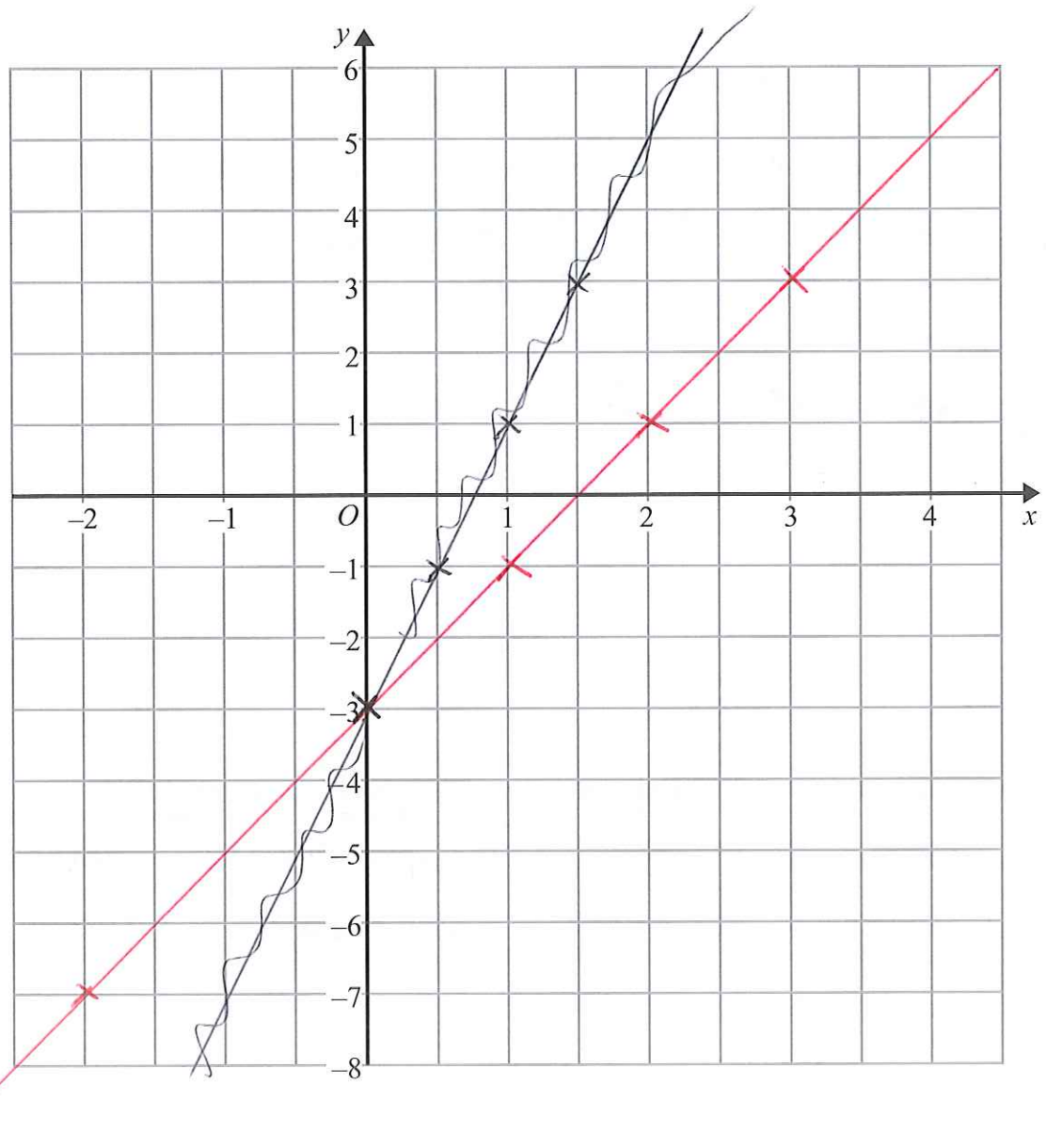
(3)

(Total for Question 1 is 5 marks)

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

x	-2	-1	0	1	2	3	4
y	-7	-5	-3	-1	1	3	5

MW 96



(Total for Question 2 is 3 marks)

MW 152

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.

$P(\text{Theme Park}) = \frac{10}{30} = \frac{1}{3}$ M1

$\frac{1}{3}$ of 195 = 65

A1

65

(2)

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

I have assumed that the sample is random and the results are representative of the whole pop. If there is bias in the sample the answer of 65 may be artificially high or low.

(1)

(Total for Question 3 is 3 marks)

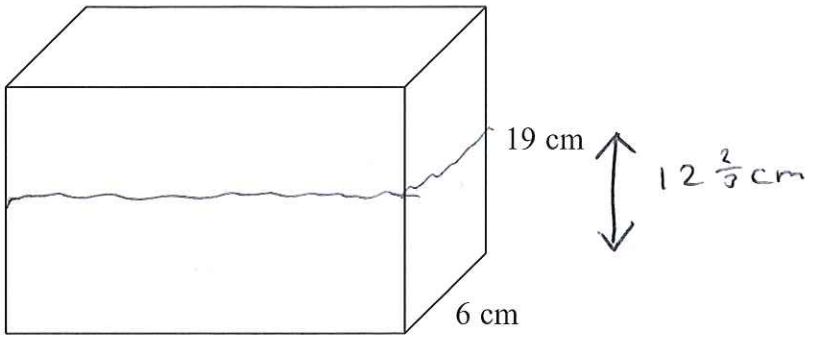
C1

MW 115

$\frac{2}{3}$ of 19 cm = $12\frac{2}{3}$ cm

4 A container is in the shape of a cuboid.

$1 cm^3 = 1 ml$



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

A cup holds 275 m*l* of water.

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

Volume water = 30 cm × 6 cm × $12\frac{2}{3}$ cm

= 2280 cm^3

= 2280 ml P1 P1

Filled Cups = $\frac{2280 ml}{275 ml}$ P1

= 8.2909

8 full cups.

A1 cao

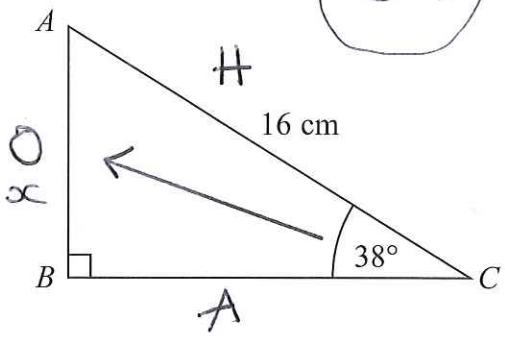
8

(Total for Question 4 is 4 marks)

MW 168

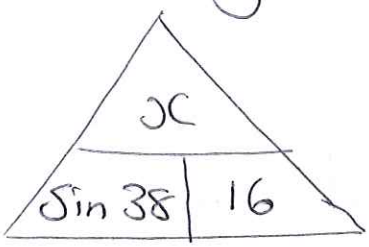
5 *ABC* is a right-angled triangle.

SOH CAH TOA



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

Let length AB = x



$x = \sin(38) \times 16$ M1
$= 9.8505\ldots$
$AB = 9.85\text{ cm}$ (2dp)

9.76 → 9.92

9.85 cm A1

(Total for Question 5 is 2 marks)

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

MW 155

The answer on her calculator display began

Complete the error interval for *y*.

$8.3 \leqslant y < 8.4$

(Total for Question 6 is 2 marks)

8.30... → 8.39...

mw 106

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

A B

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

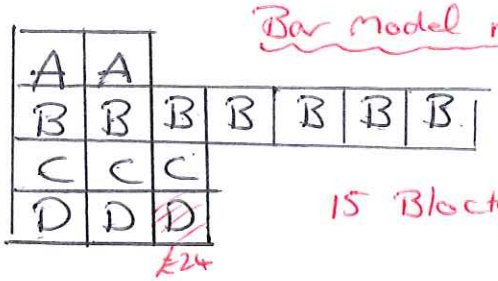
Chloe and Denesh each get 1.5 times the amount Abby gets.

Work out the amount of money that Ben gets.

P1

2 × 1·5 = 3

Bar model method



15 Blocks P1

£360 ÷ 15 = £24 P1

Ben gets 7 × £24

= £168

A : B : C : D

2 : 7 : 3 : 3

2 + 7 + 3 + 3 = 15 P1

£360 ÷ 15 = £24 P1

Ben gets 7 × £24

= £168

A1

£ 168

(Total for Question 7 is 4 marks)

mw 83

8 (a) Write 0.00562 in standard form.

B1

5.62×10^{-3}

(1)

(b) Write 1.452×10^3 as an ordinary number.

B1

1452

(1)

(Total for Question 8 is 2 marks)

MW 200

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

Circumference is a length

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

Scale Factor length $k = 0.9$ M1

Scale Factor area $k^2 = 0.81$

Area Circle A : Area Circle B

1 : 0.81

×100 ×100

100 : 81

A1 oe

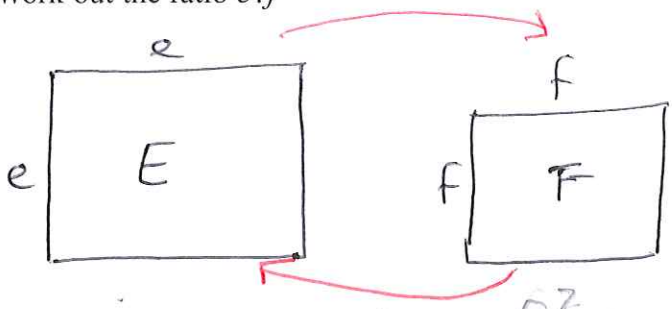
100 : 81

(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 $e : f$



$1.44e^2 : f^2$

M1 $1.2e : f$

1.2 : 1

(2)

(Total for Question 9 is 4 marks)

×5 ×5

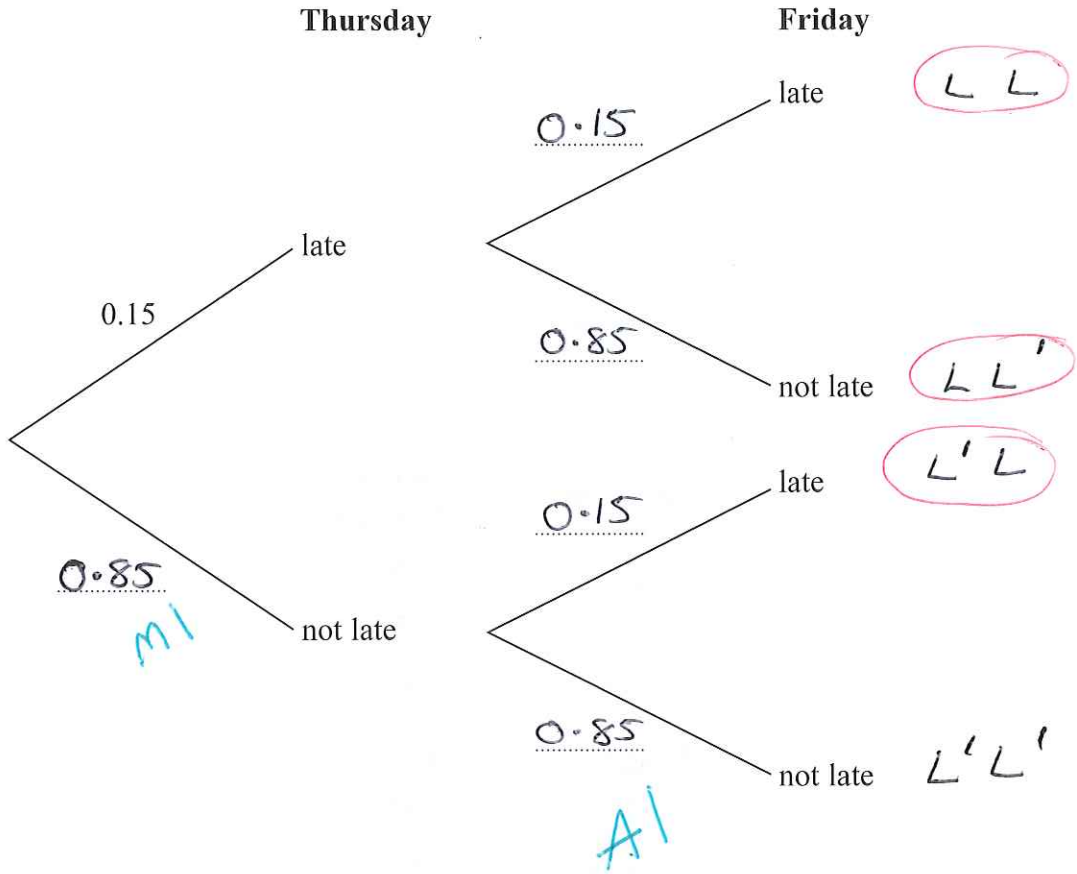
6 : 5

A1 oe

MW 151, 175

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.



(2)

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

P(L AND L OR L AND L' OR L' AND L)
= P(L L) + P(L L') + P(L' L)
= P(L) × P(L) + P(L) × P(L') + P(L') × P(L)
= 0.15 × 0.15 + 0.15 × 0.85 + 0.85 × 0.15
= 0.0225* + 0.1275* + 0.1275*
= 0.2775

M1 any one *
M1 complete method

OR
1 − P(L' L')
= 1 − (0.85 × 0.85)
= 1 − 0.7225*
= 0.2775

111/400

A1 oe
0.2775

(3)

(Total for Question 10 is 5 marks)

Mω 186

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
$0 < t \leqslant 20$	5
$20 < t \leqslant 40$	30
$40 < t \leqslant 60$	20
$60 < t \leqslant 80$	15
$80 < t \leqslant 100$	8
$100 < t \leqslant 120$	2

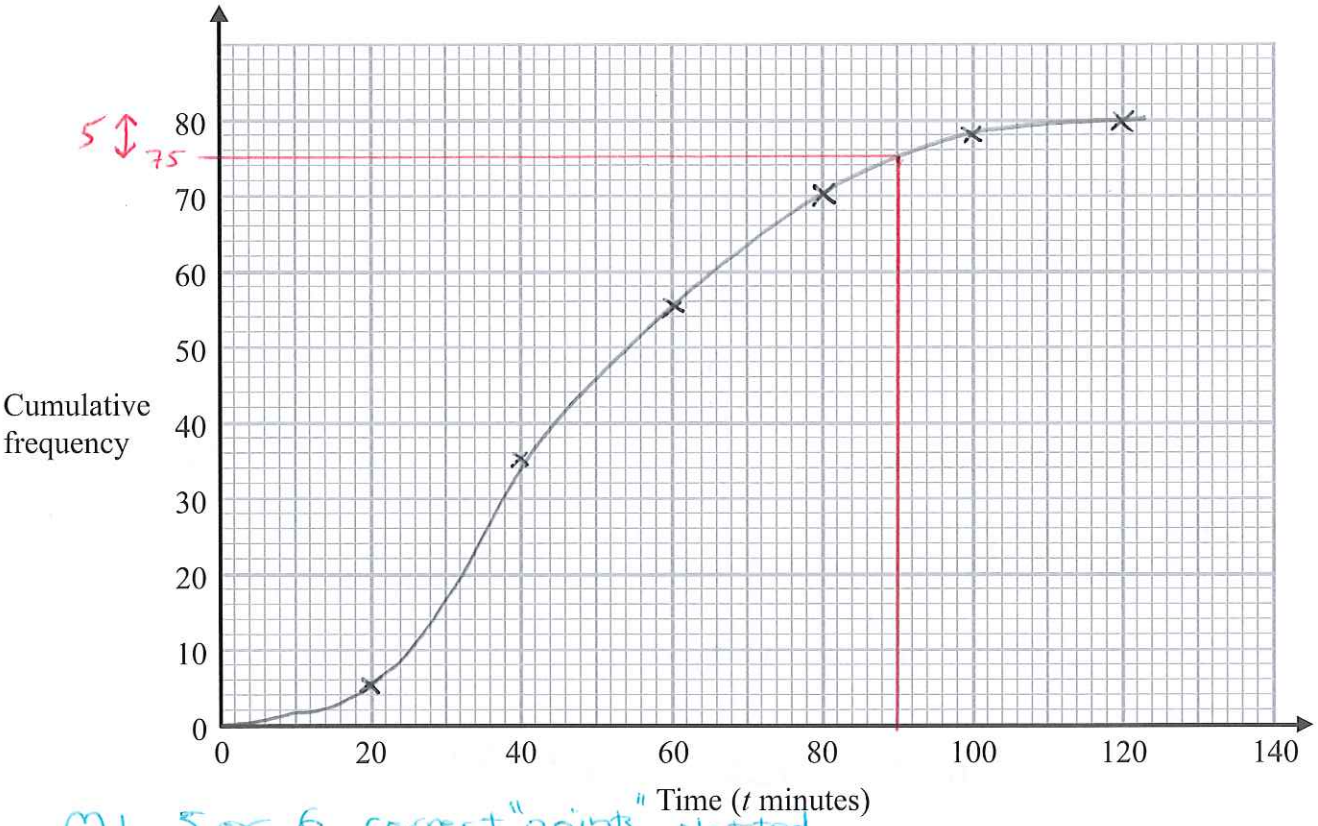
(a) Complete the cumulative frequency table.

Time (t minutes)	Cumulative frequency
$0 < t \leqslant 20$	5
$0 < t \leqslant 40$	35
$0 < t \leqslant 60$	55
$0 < t \leqslant 80$	70
$0 < t \leqslant 100$	78
$0 < t \leqslant 120$	80

(1)

B1

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



M1 5 or 6 correct "points" plotted
A1 fully correct

(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.

5
80

6.25

see mark scheme

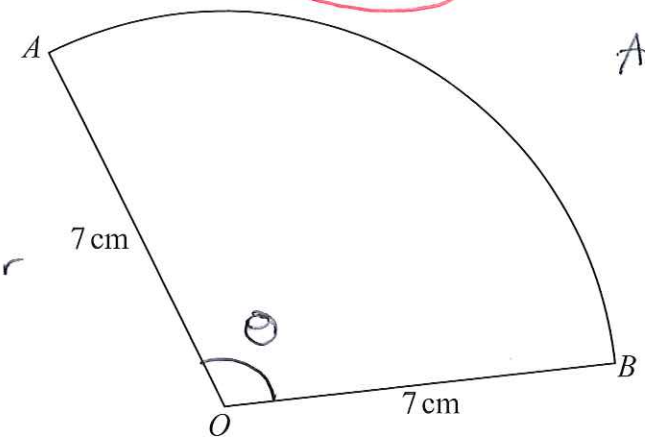
.....%

(3)

(Total for Question 11 is 6 marks)

MW 167

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



Area Sector $= \frac{\theta}{360} \times \pi r^2$

Perimeter Sector $= \frac{\theta}{360} \times 2\pi r + r + r$

or πd

The area of the sector is 40 cm^2

(P1 find area circle 153.938)

Calculate the perimeter of the sector.
Give your answer correct to 3 significant figures.

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

$$\frac{49\pi\theta}{360} = 40 \quad [\times 360$$

$$49\pi\theta = 14400 \quad [\div 49\pi$$

$$\theta = 93.54412^\circ \quad \text{P2}$$

$$\text{Perimeter Sector} = \left(\frac{\theta}{360} \times 14\pi\right) + 7 + 7$$

$$= \left(\frac{93.54412}{360} \times 14\pi\right) + 14 \quad \text{P1}$$

$$= 25.42857$$

$$= 25.4 \text{ cm (3sf)} \quad \text{A1}$$

25 → 25.44

..... cm

(Total for Question 12 is 4 marks)

MW 210

$(x+5)(x-2)$

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.

$$\left[\frac{(x+5)}{1} \times \frac{(x-1)}{(x+5)(x-2)} \right] \quad \text{B1} \quad \text{B1}$$

$$= \frac{(x+5)(x-1)}{(x+5)(x-2)}$$

$$= \frac{x-1}{x-2}$$

$$6 + \frac{x-1}{x-2}$$ get common denominator

$$= \frac{6(x-2)}{(x-2)} + \frac{x-1}{x-2} \quad \text{M1}$$

$$= \frac{6(x-2) + (x-1)}{(x-2)}$$

$$= \frac{6x - 12 + x - 1}{(x-2)}$$

$$= \frac{7x - 13}{(x-2)}$$

$$= \frac{7x-13}{x-2} \quad \text{A1}$$

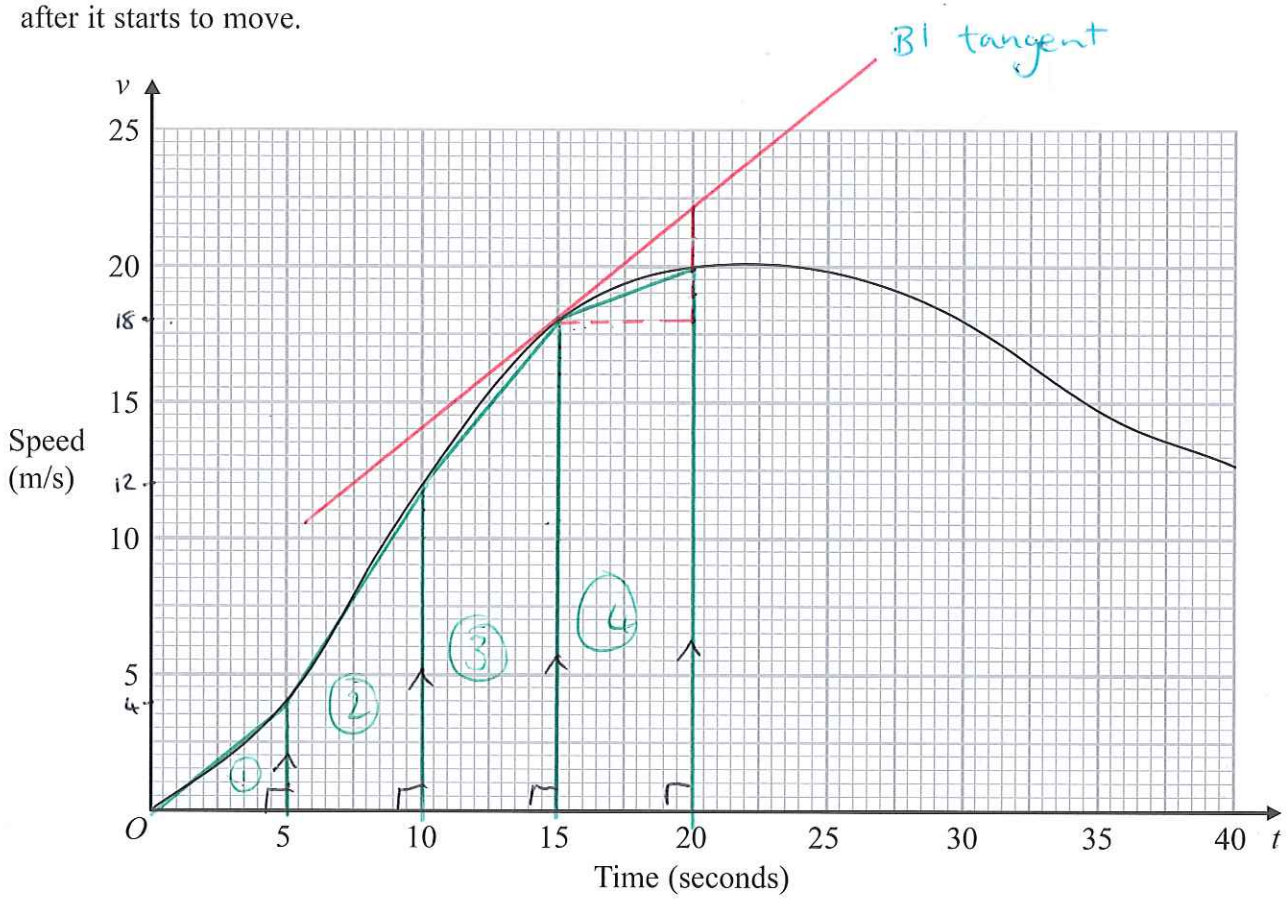
$a=7,\ b=13,\ c=1,\ d=2$

(Total for Question 13 is 4 marks)

MW 143 216

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 $t = 15$

$\frac{\text{rise}}{\text{run}} = \frac{4}{5}$ M1

A1

$0.6 \rightarrow 1.0$ 0.8

(3)

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

the acceleration C1 is $0.8\ ms^{-2}$ at $t=15$

OR every second the car is moving 0.8 m/s faster (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.

Area triangle ① $= \frac{1}{2} \times 5 \times 4$ = 10

Area trapezium ② $= \frac{1}{2}(4+12) \times 5$ = 40 P1

Area trapezium ③ $= \frac{1}{2}(12+18) \times 5$ = 75 P1

Area trapezium ④ $= \frac{1}{2}(18+20) \times 5$ = 95 +

220

A1

215 → 225 220 m

(3)

(Total for Question 14 is 7 marks)

15 Make m the subject of the formula $f = \dfrac{3m+4}{m-1}$ [×(m−1) MW 190

M1 $f(m-1) = 3m+4$

$fm - f = 3m + 4$ [−3m [+f

$fm - 3m - f = 4$

M1 $fm - 3m = 4 + f$

$m(f-3) = 4+f$

$m = \dfrac{4+f}{f-3}$ A1

.....

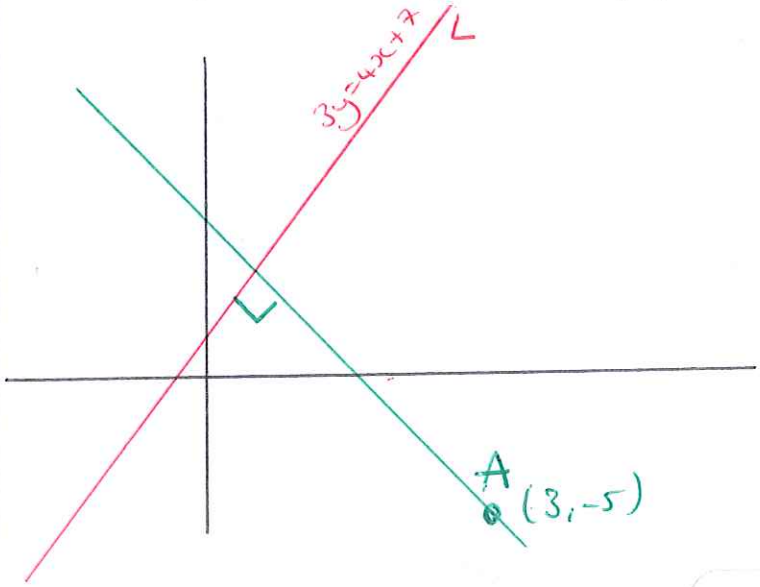
(Total for Question 15 is 3 marks)

MW 208

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

$y = \frac{4}{3}x + \frac{7}{3}$

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



perpendicular line has gradient $-\frac{3}{4}$
and when $x=3, y=-5$

$y = mx + c$

$-5 = -\frac{3}{4} \times 3 + c$

$-5 = -\frac{9}{4} + c$ [$+\frac{9}{4}$]

$-\frac{11}{4} = c$

$y = -\frac{3}{4}x - \frac{11}{4}$

(Total for Question 16 is 3 marks)

or $4y = -3x - 11$

or $4y + 3x = -11$

or $4y + 3x + 11 = 0$

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

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

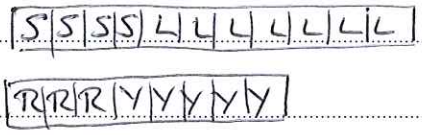
The ratio of the number of small cubes to the number of large cubes is 4 : 7

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

S : L

R : Y



11 blocks

8 blocks

88 is the LCM of 11 and 8

(1)

All the small cubes are yellow.

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

Let there be 88 cubes in the bag

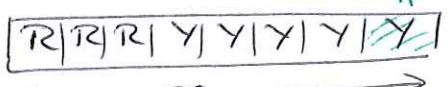
R : Y

3 : 5

×11 ×11

88 ÷ 8 = 11

33 : 55



11

88

Yellow 11 × 5 = 55

Red 11 × 3 = 33

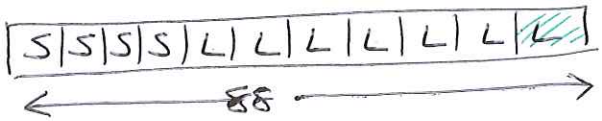
5 : L

4 : 7

×8 ×8

88 ÷ 11 = 8

32 : 56



8

88

Small 8 × 4 = 32

Large 8 × 7 = 56

There are 55 Yellow counters in the bag and 32 of these Small

55 − 32 = 23

23 of the Yellow counters are large

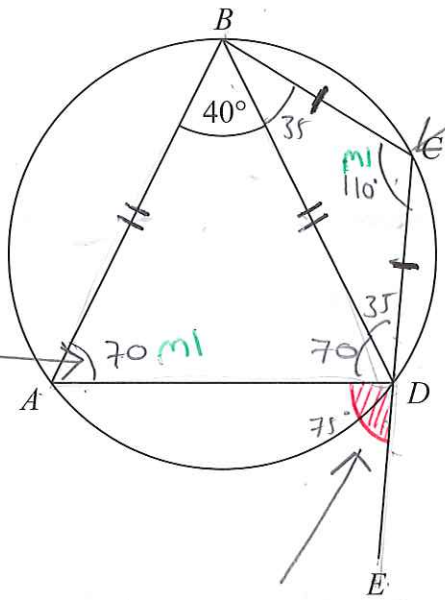
23

(3)

(Total for Question 17 is 4 marks)

MW 183

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



Opposite angles in a cyclic quadrilateral add up to 180°

Angles in a triangle add up to 180°
Base angles in an isosceles triangle are equal.

Not a tangent ∴ not alternate segment theorem.

angles on a straight line add up to 180°

$BA = BD$
$CB = CD$
Angle $ABD = 40°$

Work out the size of angle ADE.
You must give a reason for each stage of your working.

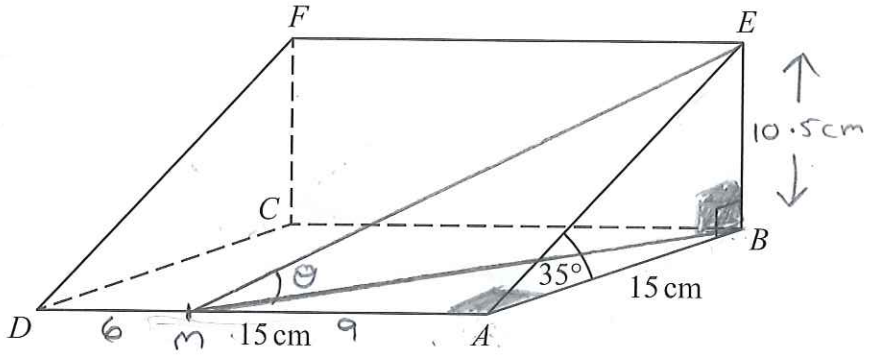
C2 two correct reasons

A1
75°

(Total for Question 18 is 5 marks)

MW 150, 168

19 The diagram shows a triangular prism.



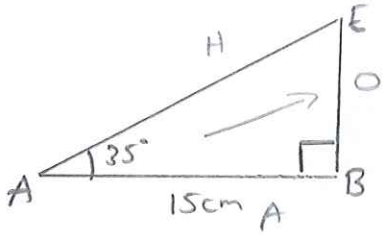
The base, *ABCD*, of the prism is a square of side length 15 cm.
Angle *ABE* and angle *CBE* are right angles.
Angle *EAB* = 35°

M is the point on *DA* such that

$$DM : MA = 2 : 3$$

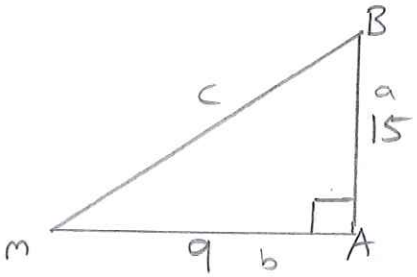
DM = 6
MA = 9

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

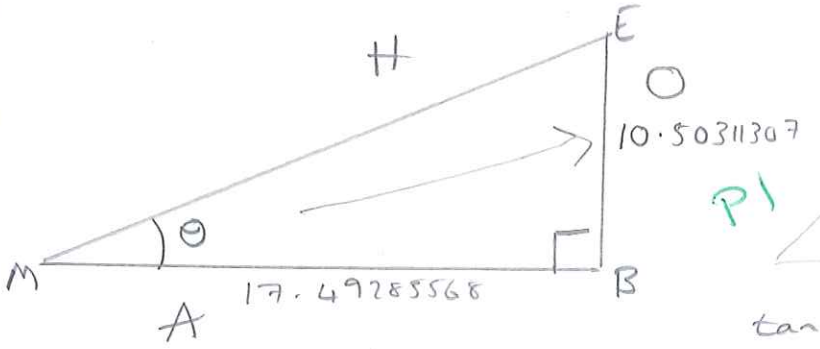


SOH CAH TOA

$EB = \tan(35) \times 15$
$= 10.50311307$ cm P1

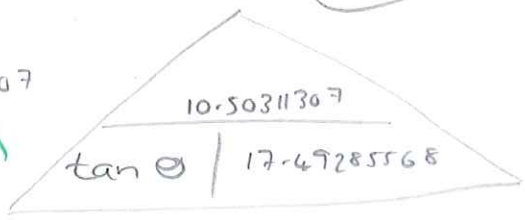


$c^2 = a^2 + b^2$
$(MB)^2 = 15^2 + 9^2$
$= 306$
$MB = 17.49285568$ cm P1



P1

SOH CAH TOA



$\tan\theta = \frac{10.50311307}{17.49285568}$

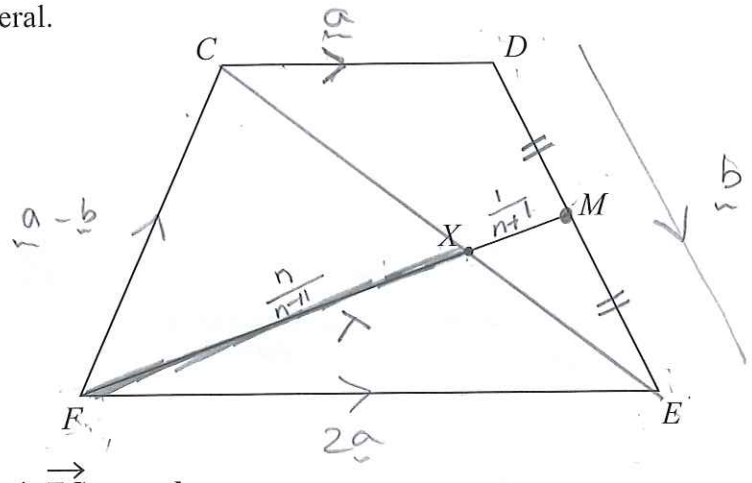
$\theta = 30.9815\ldots$ A1

30·9 → 31 31·0 °

(Total for Question 19 is 4 marks)

MW 219

20 *CDEF* is a quadrilateral.



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

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

$\overrightarrow{FE} = \overrightarrow{FC} + \overrightarrow{CD} + \overrightarrow{DE}$
$= \underset{\sim}{a} - \underset{\sim}{b} + \underset{\sim}{a} + \underset{\sim}{b}$
$= 2\underset{\sim}{a}$

$2\underset{\sim}{a}$

(2)

M is the midpoint of *DE*.
X is the point on *FM* such that $FX : XM = n : 1$
CXE is a straight line. n : 1

(b) Work out the value of *n*.

$\overrightarrow{FM} = \overrightarrow{FC} + \overrightarrow{CD} + \overrightarrow{DM}$
$= \underset{\sim}{a} - \underset{\sim}{b} + \underset{\sim}{a} + \frac{1}{2}\underset{\sim}{b}$
$= 2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}$

$\overrightarrow{FM} = \overrightarrow{FE} + \overrightarrow{EM}$
$= 2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}$

$\overrightarrow{CE} = \underset{\sim}{a} + \underset{\sim}{b}$
$\overrightarrow{CX} = \mu(\underset{\sim}{a} + \underset{\sim}{b})$

$\overrightarrow{XM} = \frac{1}{n+1}\left(2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}\right)$

$\overrightarrow{FX} = \frac{n}{n+1}\left(\overrightarrow{FM}\right)$
$= \frac{n}{n+1}\left(2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}\right)$

$\overrightarrow{XE} = \overrightarrow{XM} + \overrightarrow{ME}$
$= \frac{1}{n+1}\left(2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}\right) + \frac{1}{2}\underset{\sim}{b}$

λ

FX : XM

$\frac{n}{n+1}\left(2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}\right) : \frac{1}{n+1}\left(2\underset{\sim}{a} - \frac{1}{2}\underset{\sim}{b}\right)$

$\frac{n}{n+1} : \frac{1}{n+1}$

$n : 1$

$\overrightarrow{FX} = \overrightarrow{FC} + \overrightarrow{CX}$
$= (\underset{\sim}{a} - \underset{\sim}{b}) + \mu(\underset{\sim}{a} + \underset{\sim}{b})$
$= \underset{\sim}{a} - \underset{\sim}{b} + \mu\underset{\sim}{a} + \mu\underset{\sim}{b}$
$= (\mu + 1)\underset{\sim}{a} + (\mu - 1)\underset{\sim}{b}$
$\overrightarrow{FX} = 2\underset{\sim}{a}\lambda - \frac{1}{2}\underset{\sim}{b}\lambda$

$\mu + 1 = 2\lambda$
$\mu - 1 = -\frac{1}{2}\lambda$

$2\mu - 4\lambda = -2$
$2\mu + \lambda = 2$

$-5\lambda = -4$
$\lambda = 4/5$

$n =$ 4

(4)

(Total for Question 20 is 6 marks)

TOTAL FOR PAPER IS 80 MARKS

4 : 1