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)

Wednesday 11 June 2025

Morning (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 or B pencil, eraser, calculator, Formulae Sheet (enclosed). Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P76407A

P 7 6 4 0 7 A 0 1 2 4

Pearson

Answer ALL questions.

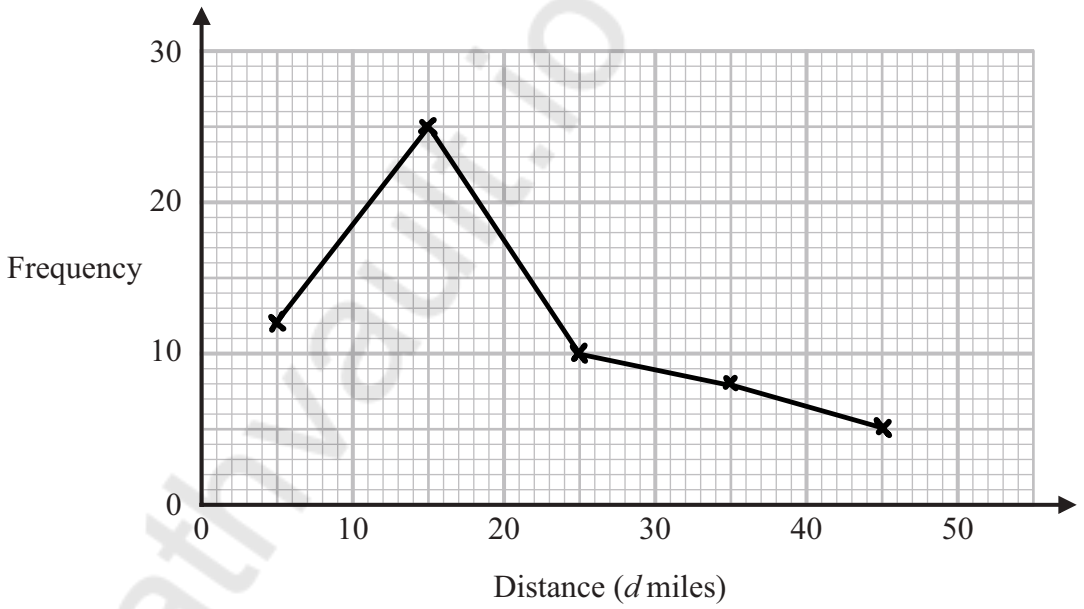
Write your answers in the spaces provided.

You must write down all the stages in your working.

1 The table shows information about the distances that 60 people travel to work.

Distance (d miles)	Frequency	midpoint
$0 < d \leqslant 10$	12	5
$10 < d \leqslant 20$	25	15
$20 < d \leqslant 30$	10	25
$30 < d \leqslant 40$	8	35
$40 < d \leqslant 50$	5	45

Draw a frequency polygon for the information in the table.



(Total for Question 1 is 2 marks)

2 Ben is trying to make m the subject of $p = \frac{m}{3} + 5$

Here is his working.

$$p - 5 = \frac{m}{3} \quad ✓$$

$$3 \times (p - 5) = m$$

$$m = 3p - 5$$

-15

Ben's answer is wrong.

(a) What mistake has Ben made?

-5 should be multiplied by 3

(1)

(b) Factorise fully $2x^3y + 4xy^2$

HCF of 2 and 4 = 2

HCF of x^3 and x = x

HCF of y and y^2 = y

$2xy(x^2 + 2y)$

$2xy \times x^2 = 2x^3y$

$2xy \times 2y = 4xy^2$

$2xy(x^2 + 2y)$

(2)

(Total for Question 2 is 3 marks)

3 Mia pays £25 for 200 oranges.

Mia puts the oranges into bags.
She puts 5 oranges into each bag.

Mia sells all the bags of oranges for £1 each bag.

Work out Mia's percentage profit.

Bags = 200 ÷ 5
= 40

40 × £1 = £40

Profit = £40 − £25
= 15

$\frac{15}{25} \times 100 = 60$

60 %

(Total for Question 3 is 3 marks)

4 In London, 2 kg of carrots cost £3.75
In New York, 5 lbs of carrots cost 4.90 US dollars.

£1 = 1.20 US dollars (×1.20)

1 kg = 2.2 lbs (×2.2)

In which city are carrots better value for money, London or New York?
You must show how you get your answer.

London

2 kg = £3.75

×2.2 ↓

4.4 lbs = £3.75

×1.2 ↓

4.4 lbs = $4.50

÷4.4 ↓

1 lb = $1.02̇

New York

5 lb = $4.90

÷5 ↓

1 lb = $0.98

÷5 ↓

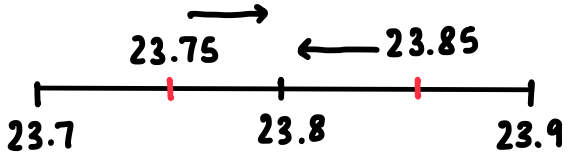
$0.98 < $1.02̇

New York

(Total for Question 4 is 4 marks)

5 Karim rounds a number, n, to 1 decimal place.
The result is 23.8

Complete the error interval for n.



23.75 $\leqslant n <$ 23.85

(Total for Question 5 is 2 marks)

6 A plane takes 2 hours 24 minutes to fly from Luton to Alicante.
The plane flies a distance of 1512 kilometres.

Work out the average speed of the plane.
Give your answer in kilometres per hour.

D
S T

$S = \frac{D}{T}$

D = 1512 km

T = 2h 24 mins

$= 2\frac{24}{60}$

= 2.4 hours

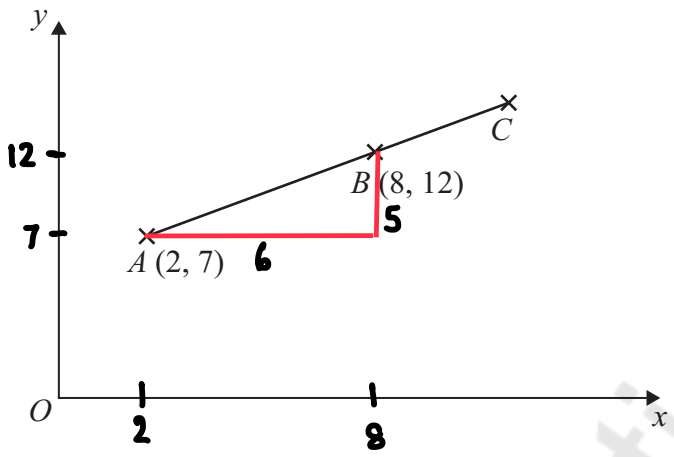
$S = \frac{1512 \text{ km}}{2.4 \text{ hrs}}$

= 630 km / h

630 kilometres per hour

(Total for Question 6 is 3 marks)

7 ABC is a straight line.



Point A has coordinates (2, 7)
Point B has coordinates (8, 12)

$BC = \frac{1}{2} AB$

Find the coordinates of point C.

$\frac{1}{2}$ of 6 = 3

$\frac{1}{2}$ of 5 = 2.5

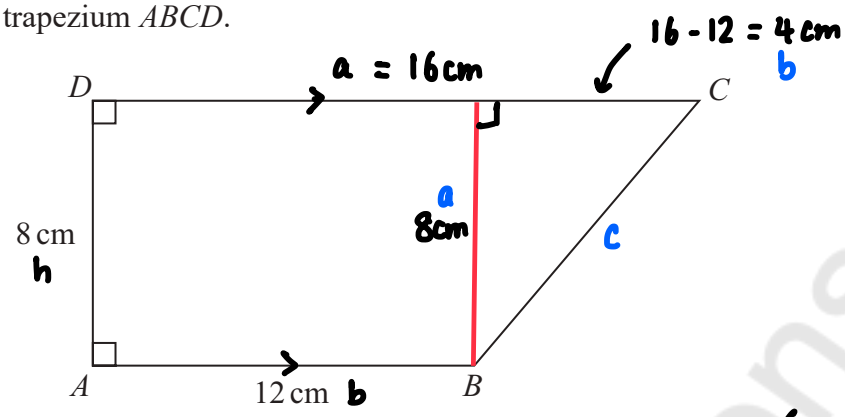
C (8 + 3, 12 + 2.5)

(11, 14.5)

(11 , 14.5)

(Total for Question 7 is 3 marks)

8 The diagram shows trapezium $ABCD$.



$AB = 12\,\text{cm}$
$AD = 8\,\text{cm}$

The trapezium has an area of $112\,\text{cm}^2$

→ Add all sides

Work out the perimeter of the trapezium.
Give your answer correct to 3 significant figures.

$$\text{Area} = \frac{(a+b)}{2} \times h$$

$$112 = \frac{(a+12)}{2} \times 8$$

$\div 8 \qquad \div 8$

$$14 = \frac{(a+12)}{2}$$

$\times 2 \qquad \times 2$

$$28 = a + 12$$

$-12 \qquad -12$

$$16 = a$$

$$a^2 + b^2 = c^2$$

$$8^2 + 4^2 = BC^2$$

$\sqrt{} \qquad \sqrt{}$

$$\sqrt{8^2+4^2} = BC$$

$$4\sqrt{5}\ \text{cm} = BC$$

$$\text{Perimeter} = 8 + 12 + 16 + 4\sqrt{5}$$
$$= 36 + 4\sqrt{5}$$
$$= 44.94427191$$
$$\approx 44.9\ \text{cm}$$

44.9 ..... cm

(Total for Question 8 is 5 marks)

9 (a) Write 5.73×10^6 as an ordinary number.

5.73 0 0 0 0.

5,730,000

(1)

(b) Write 0.035 in standard form.

-2

3.5×10^{-2}

3.5×10^{-2}

(1)

(Total for Question 9 is 2 marks)

10 Use your calculator to work out $\dfrac{\left(1.8^3 \times \cos 35°\right)^2}{\sqrt[3]{17.4 - \tan 85°}}$

Give your answer correct to 3 significant figures.

12.58077014

≈ 12.6

12.6

(Total for Question 10 is 2 marks)

11 $\dfrac{3^n \times 3^{20}}{3^8} = 3^{14}$

(a) Find the value of n.

$$\frac{3^n \times 3^{20}}{3^8} = 3^{14}$$

$\times 3^8 \qquad \times 3^8$

$$3^n \times 3^{20} = 3^{14} \times 3^8$$

$$3^{n+20} = 3^{22}$$

$$n + 20 = 22$$

$$n = 2$$

$n =$ 2

(2)

(b) Write $\left(64m^{12}\right)^{\frac{2}{3}}$ in the form am^b where a and b are integers.

$$x^{\frac{a}{b}} = \left(\sqrt[b]{x}\right)^a$$

$$\left(\sqrt[3]{64m^{12}}\right)^2$$

$$\left(4m^4\right)^2 = 16m^8$$

$16m^8$

(2)

(Total for Question 11 is 4 marks)

12 The price of a holiday is increased by 10%

After the increase, the price of the holiday is £440

Jim says,

"10% of £440 is £44 so the price of the holiday before the increase was £396"

(a) Is Jim correct?
Explain your answer.

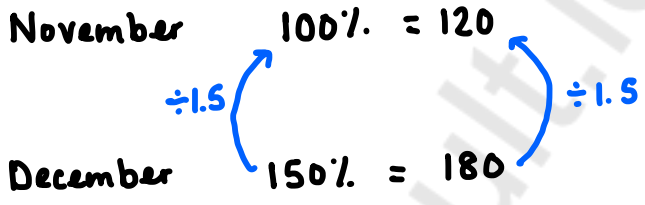
No. We need 10% of the original price, not of £440.

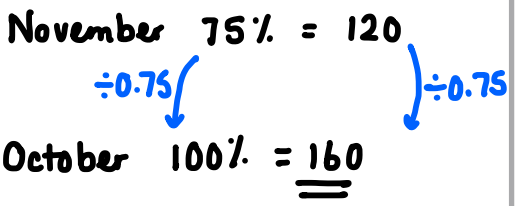
(1)

Tina sells bikes.

In November, Tina sold 25% fewer bikes than she sold in October. (75%)
In December, Tina sold 50% more bikes than she sold in November. (150%)
In December, Tina sold 180 bikes.

(b) How many bikes did Tina sell in October?





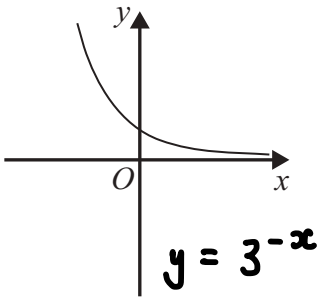
160

(3)

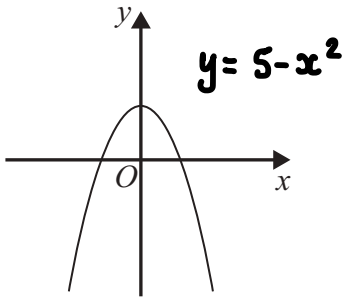
(Total for Question 12 is 4 marks)

13 Here are some graphs.

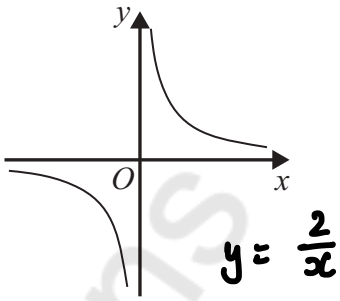
A



B



C



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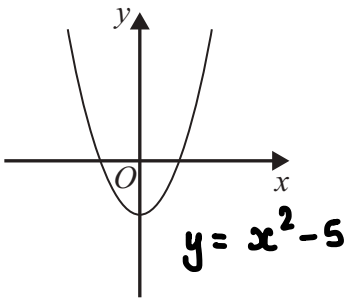

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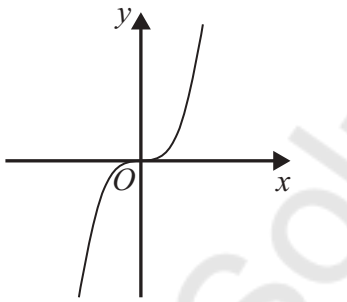

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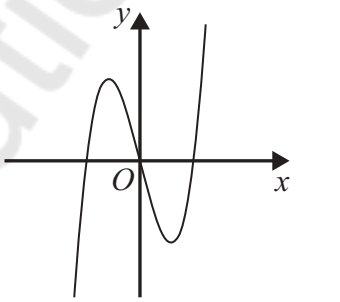

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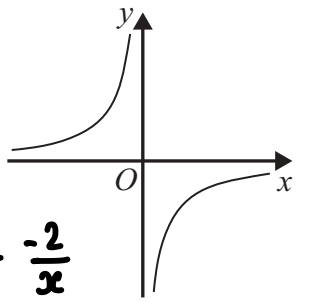
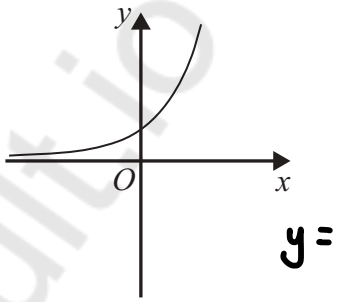


H



Each equation in the table is the equation of one of the graphs.

Complete the table.

Equation	Letter of graph
$y = x^3$	E
$y = \frac{2}{x}$	C
$y = 5 - x^2$	B
$y = 3^x$	H

Cubic

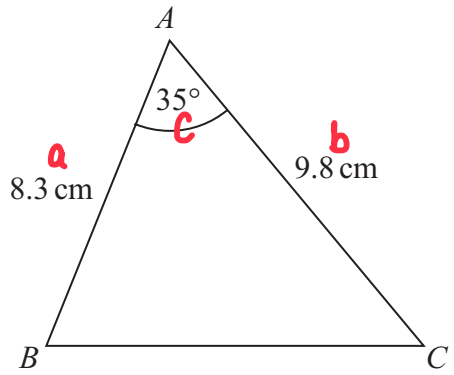
Reciprocal

Quadratic

Exponential

(Total for Question 13 is 3 marks)

14 Here is triangle *ABC*.



Calculate the area of triangle *ABC*.
Give your answer correct to 3 significant figures.

Area = $\frac{1}{2}ab\sin C$

$= \frac{1}{2} \times 8.3 \times 9.8 \times \sin(35)$

$= 23.32735367$

$\approx 23.3 \text{ cm}^2$

..... 23.3 ..... cm^2

(Total for Question 14 is 2 marks)

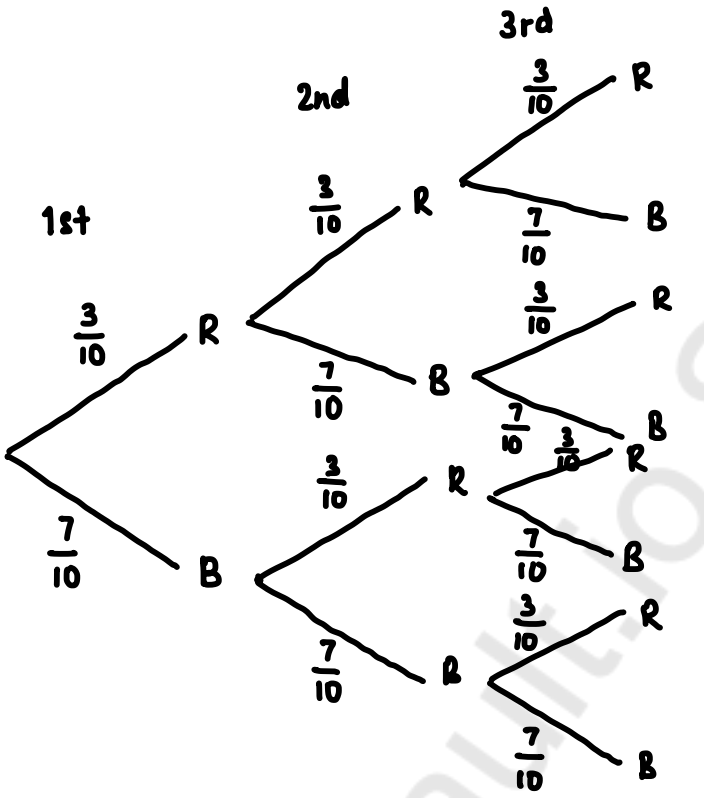
15 There are only 7 blue pens and 3 red pens in a box. 10 pens total

Raja takes at random one of the pens.
He notes the colour of the pen and puts the pen back into the box.

Raja does this two more times.

Show that the probability that Raja takes at least two blue pens is $\frac{98}{125}$

p(blue) = $\frac{7}{10}$ p(red) = $\frac{3}{10}$



RRR

RRB

RBR

RBB

BRR

$\frac{3}{10} \times \frac{7}{10} \times \frac{7}{10} = \frac{147}{1000}$

BRB

$\frac{7}{10} \times \frac{3}{10} \times \frac{7}{10} = \frac{147}{1000}$

BBR

$\frac{7}{10} \times \frac{7}{10} \times \frac{3}{10} = \frac{147}{1000}$

BBB

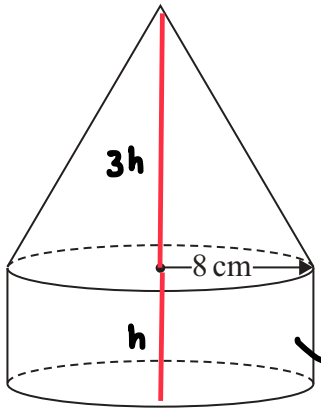
$\frac{7}{10} \times \frac{7}{10} \times \frac{7}{10} = \frac{343}{1000}$

$3 \times \frac{147}{1000} + \frac{343}{1000} = \frac{784}{1000}$

$= \frac{98}{125}$

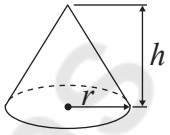
(Total for Question 15 is 4 marks)

16 The diagram shows a solid shape made from a cylinder and a cone.



$V = \pi r^2 h$

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



The cone has a base radius of 8 cm.
The cylinder has a radius of 8 cm.

The vertical height of the cone is three times the height of the cylinder.

The volume of the solid shape is $640\pi\,\text{cm}^3$

Work out the vertical height of the cone.
You must show all your working.

Cylinder $r = 8$ $h = h$

$V = \pi(8)^2(h)$

$= 64\pi h \text{ cm}^3$

Cone $r = 8$ $h = 3h$

$V = \frac{1}{3}\pi(8)^2(3h)$

$= 64\pi h \text{ cm}^3$

$64\pi h + 64\pi h = 640\pi$

$128\pi h = 640\pi$

$128h = 640$

$\div 128 \qquad \div 128$

$h = 5$

Cone height $= 3h$

$= 15$

15 cm

(Total for Question 16 is 4 marks)

17 Solve $\dfrac{5x}{3x-1} - \dfrac{2x}{3x+1} = 1$

$$\frac{5x(3x+1) - 2x(3x-1)}{(3x-1)(3x+1)} = 1$$

$$\frac{15x^2 + 5x - 6x^2 + 2x}{(3x-1)(3x+1)} = 1$$

$$\frac{9x^2 + 7x}{(3x-1)(3x+1)} = 1$$

$$9x^2 + 7x = (3x-1)(3x+1)$$

$$9x^2 + 7x = 9x^2 + 3x - 3x - 1$$

$$9x^2 + 7x = 9x^2 - 1$$

$$7x = -1$$

$$\div 7 \qquad \div 7$$

$$x = \frac{-1}{7}$$

$x =$ $\frac{-1}{7}$

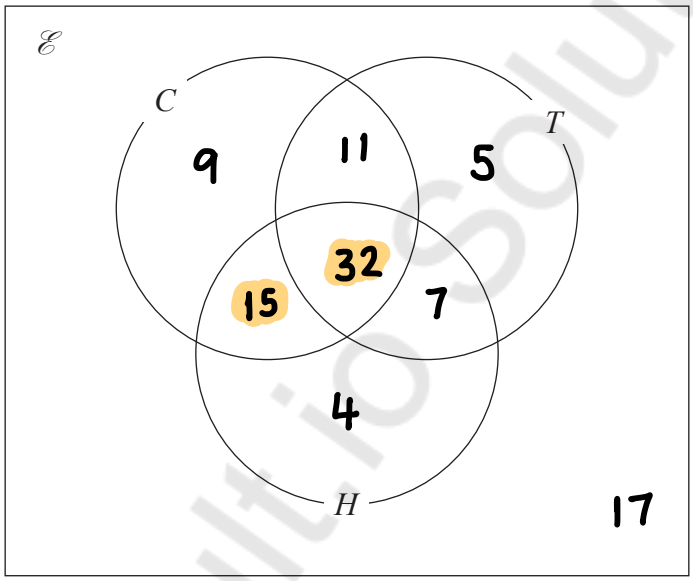
(Total for Question 17 is 3 marks)

18 Magda carried out a survey to find out the drinks that people like.

She asked 100 people if they like coffee (C) or tea (T) or hot chocolate (H).

32 people like all three drinks. ✓
15 people like coffee and hot chocolate but **not** tea. ✓
43 people like coffee and tea. 43 - 32 = 11
39 people like tea and hot chocolate. 39 - 32 = 7
67 people like coffee. 67 - 11 - 32 - 15 = 9
58 people like hot chocolate. 58 - 15 - 32 - 7 = 4
5 people like **only** tea.

(a) Complete the Venn diagram for this information.



100 - rest of diagram

(4)

One of the people is chosen at random.

Given that this person likes coffee,

(b) find the probability that this person also likes hot chocolate.

C = 9 + 11 + 15 + 32
= 67

15 + 32 = 47

$\frac{47}{67}$

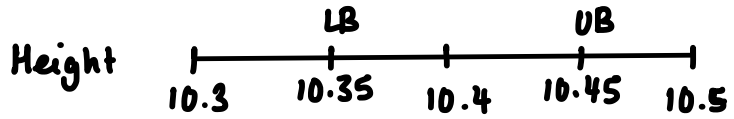
(2)

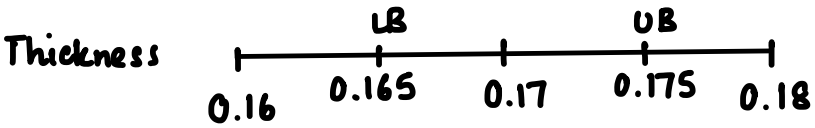
(Total for Question 18 is 6 marks)

19 There are some sheets of paper in a pile.

The height of the pile is 10.4 cm, correct to the nearest mm.
The thickness of each sheet of paper is 0.17 mm, correct to 2 significant figures.

Calculate the upper bound for the number of sheets of paper in the pile.
You must show all your working.





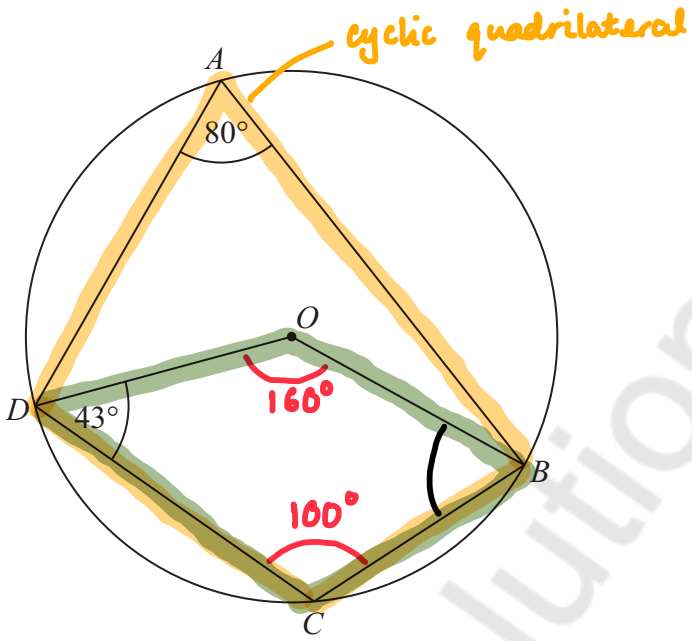
$$\text{Sheets}_{UB} = \frac{\text{Height}_{UB}}{\text{Thickness}_{LB}}$$

$$= \frac{10.45\text{cm}}{0.165\text{mm}} = \frac{10.45\text{ cm}}{0.0165\text{ cm}} = 633.\dot{3}$$

633

(Total for Question 19 is 3 marks)

20 A, B, C and D are points on a circle with centre O.



Find the size of angle OBC.
Write down any circle theorems that you use.

$\angle DOB = 160°$ Angle at centre is twice the angle at the circumference

$\angle DCB = 100°$ Opposite angles in a cyclic quadrilateral sum to 180°

$\angle OBC = 360 - (43 + 160 + 100)$
$= 57°$
[Angles in a quadrilateral sum to 360°]

57 °

(Total for Question 20 is 4 marks)

21 Solve algebraically the simultaneous equations

$$3x^2 + 2y^2 = 44$$
$$3x + y = 2 \longrightarrow y = 2 - 3x$$

$3x^2 + 2(2-3x)^2 = 44$

$3x^2 + 2(2-3x)(2-3x) = 44$

$3x^2 + 2(4 - 6x - 6x + 9x^2) = 44$

$3x^2 + 2(4 - 12x + 9x^2) = 44$

$3x^2 + 8 - 24x + 18x^2 = 44$

$21x^2 - 24x + 8 = 44$

$-44 \quad -44$

$21x^2 - 24x - 36 = 0$

$\div 3 \qquad \div 3$

$7x^2 - 8x - 12 = 0$

$7 \times -12 = -84$

$+6 \times -14 = -84$

$+6 + -14 = -8$

	84
1	84
2	42
3	28
4	21
6	14

$7x^2 + 6x - 14x - 12$

$x(7x+6) \quad -2(7x+6)$

$(7x+6)(x-2) = 0$

$7x + 6 = 0 \qquad x - 2 = 0$

$x = -\frac{6}{7} \qquad x = 2$

$y = 2 - 3x$

$y = 2 - 3\left(-\frac{6}{7}\right) \qquad y = 2 - 3(2)$

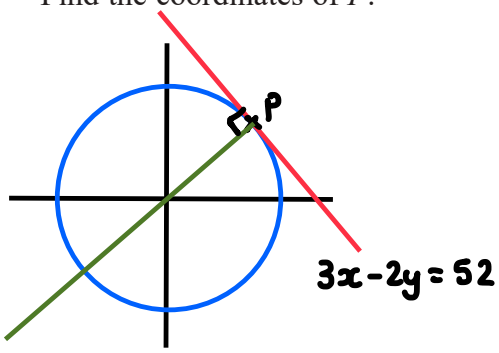
$= \frac{32}{7} \qquad = -4$

$x = -\frac{6}{7}, \ y = \frac{32}{7}, \ x = 2, \ y = -4$

(Total for Question 21 is 5 marks)

22 **C** is a circle with centre (0, 0)
The straight line with equation $3x - 2y = 52$ is the tangent to **C** at the point P.

Find the coordinates of P.



$3x-2y=52$

$-3x \qquad -3x$

$-2y = -3x+52$

$\div -2 \qquad \div -2$

$y = \frac{3}{2}x - 26$

$y = mx + c$

$m = \frac{3}{2}$ (gradient)

$m_{radius} = \frac{-2}{3}$ (0,0)

$0 = -\frac{2}{3}(0) + c$

$0 = c$

Radius : $y = -\frac{2}{3}x$

$-\frac{2}{3}x = \frac{3}{2}x - 26$

$+\frac{2}{3}x \qquad +\frac{2}{3}x$

$0 = \frac{13}{6}x - 26$

$+26 \qquad +26$

$\frac{13}{6}x = 26$

$13x = 156$

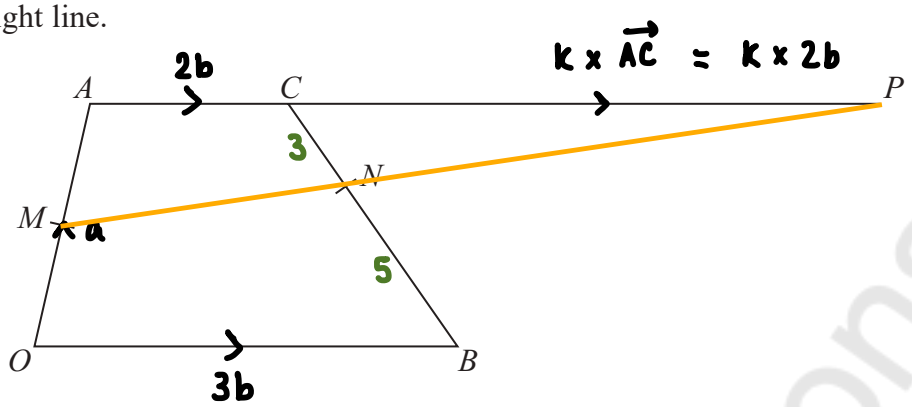
$x = \frac{156}{13} = 12$

$y = -\frac{2}{3}(12)$
$= -8$

(12 , -8)

(Total for Question 22 is 4 marks)

23 *OACB* is a quadrilateral.
ACP is a straight line.



$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = 3\mathbf{b}$ $\overrightarrow{AC} = 2\mathbf{b}$

$\overrightarrow{CP} = k \times \overrightarrow{AC}$ where k is a scalar.

Given that MNP is a straight line, find the value of k.
You must show all your working.

$$\overrightarrow{BC} = \overrightarrow{BO} + \overrightarrow{OA} + \overrightarrow{AC}$$
$$= -3b + a + 2b$$
$$= a - b$$

$$\overrightarrow{MN} = \overrightarrow{MO} + \overrightarrow{OB} + \overrightarrow{BN}$$
$$= \frac{1}{2}(-a) + 3b + \frac{5}{8}(\overrightarrow{BC})$$
$$= -\frac{1}{2}a + 3b + \frac{5}{8}(a-b)$$
$$= -\frac{1}{2}a + 3b + \frac{5}{8}a - \frac{5}{8}b$$
$$= \frac{1}{8}a + \frac{19}{8}b$$

$$\overrightarrow{NP} = \overrightarrow{NC} + \overrightarrow{CP}$$
$$= \frac{3}{8}(\overrightarrow{BC}) + k(2b)$$
$$= \frac{3}{8}(a-b) + k(2b)$$
$$= \frac{3}{8}a - \frac{3}{8}b + k(2b)$$

$$\overrightarrow{NP} = x(\overrightarrow{MN})$$
$$= x\left(\frac{1}{8}a + \frac{19}{8}b\right)$$
$$= \frac{1}{8}ax + \frac{19}{8}bx$$

$\frac{3}{8}a = \frac{1}{8}ax$

$\frac{3}{8} = \frac{1}{8}x$

$\div \frac{1}{8}$ $\div \frac{1}{8}$

$3 = x$

$x = 3$

$-\frac{3}{8}b + k(2b) = \frac{19}{8}bx$

$-\frac{3}{8} + 2k = \frac{19}{8}x$

$\times 8$ $\times 8$

$-3 + 16k = 19x$

$\div 19$ $\div 19$

$\frac{-3+16k}{19} = x$

$\frac{-3+16k}{19} = 3$

$\times 19$ $\times 19$

$-3 + 16k = 57$

$+3$ $+3$

$16k = 60$

$\div 16$ $\div 16$

$k = \frac{60}{16} = \frac{15}{4}$

$k =$ $\frac{15}{4}$

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS

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