Candidate surname

Other names

Centre Number

Candidate Number

Time 1 hour 30 minutes

Mathematics
PAPER 2 (Calculator)
Foundation Tier

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator, Formulae Sheet (enclosed). 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.
- Try to answer every question.
- Check your answers if you have time at the end.
- Good luck with your examination.

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 Write 1476 to the nearest 10

6 is greater than 5
so round up

1480 ①

(Total for Question 1 is 1 mark)

2 Write a fraction in the box to make the calculation correct.

$1 - \dfrac{3}{10} = \boxed{\dfrac{7}{10}}$ ①

$1 = \dfrac{10}{10}$

$\dfrac{10}{10} - \dfrac{3}{10} = \dfrac{10-3}{10} = \dfrac{7}{10}$

(Total for Question 2 is 1 mark)

3 Here is a list of numbers.

3   3   3   3   4   4   5   7   8

Write down the mode of the numbers.

Mode = the most frequent

3 ①

(Total for Question 3 is 1 mark)

4 Write down a 3 digit number that is a multiple of 5

Any number ending in
0 or 5 is a multiple of 5.

125 ①

(Total for Question 4 is 1 mark)

5 Write 0.4 as a percentage.

$0.4 = \dfrac{0.4}{1} = \dfrac{40}{100} = 40\%.$

40 ① %

(Total for Question 5 is 1 mark)

2

6 Write the following numbers in order of size.
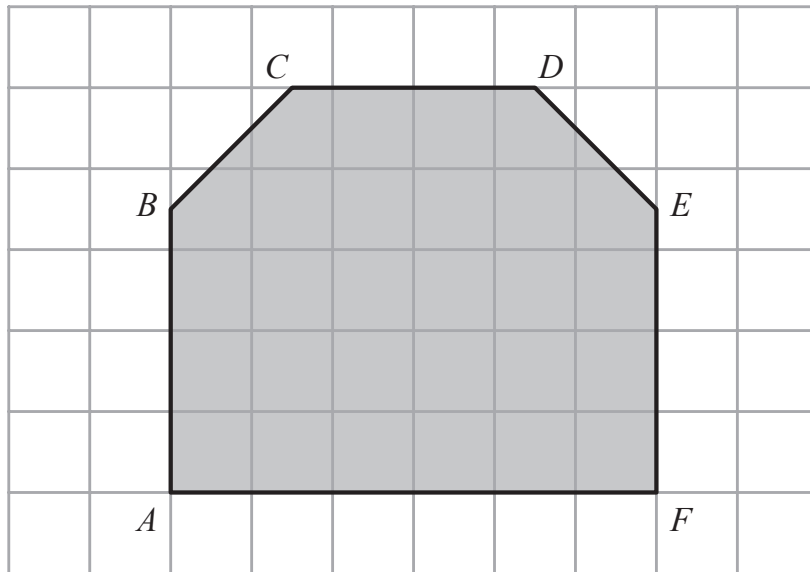Start with the smallest number.

$$-11 \qquad -2 \qquad 8 \qquad -7 \qquad 3 \qquad 10$$

①

$-11, -7, -2, 3, 8, 10$

(Total for Question 6 is 1 mark)

---

7 Here is polygon *ABCDEF* on a square grid.

(a) Write down the mathematical name of the polygon.

Any six-sided polygon is a hexagon

①

hexagon

(1)

(b) Which side of the polygon is parallel to the side *CD*?

①

AF

parallel = has same slope

(1)

(c) Write down a side of the polygon that is perpendicular to the side *AF*.
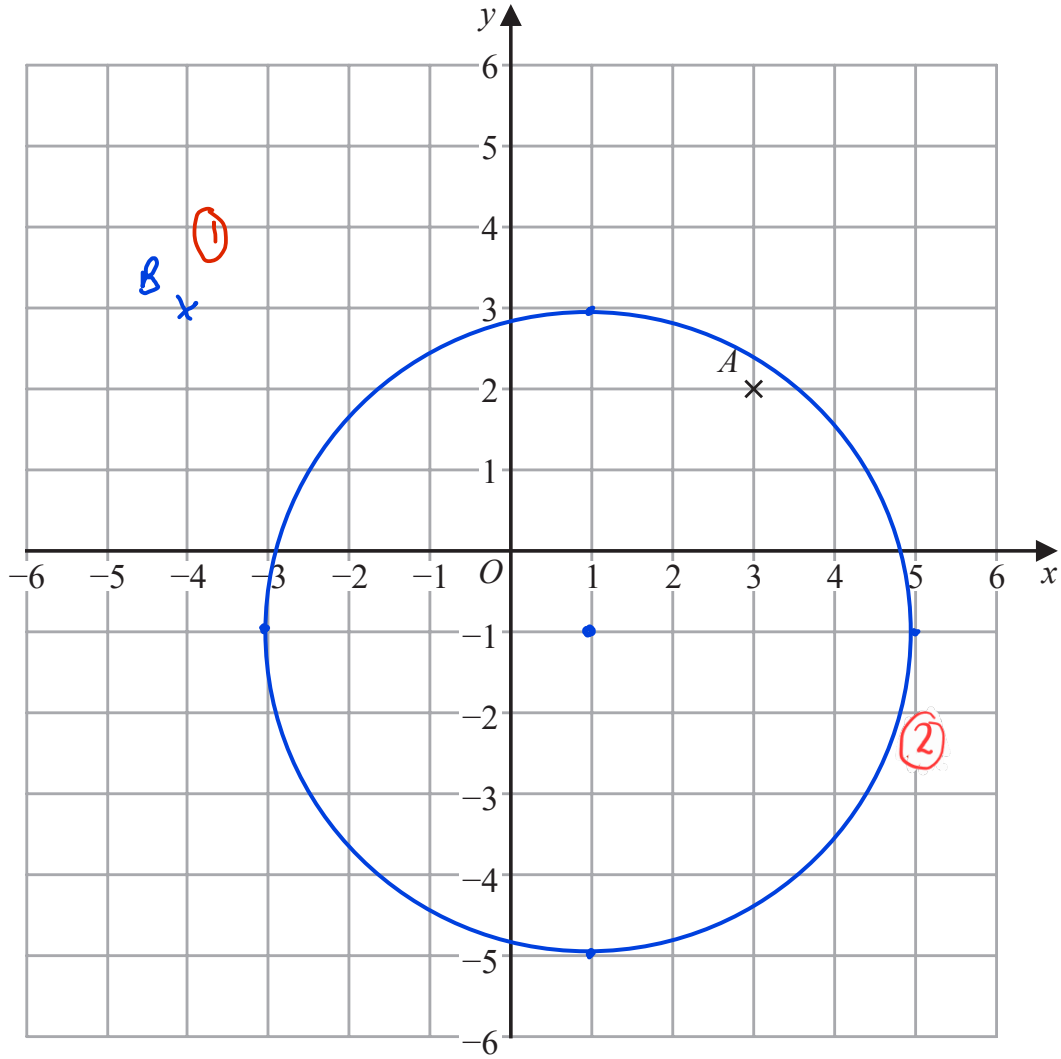
①

AB

perpendicular = at right angles to

(1)

(Total for Question 7 is 3 marks)

3

8 Here is a centimetre grid.

(a) Write down the coordinates of point *A*.

(3 , 2)

(1)

(b) On the grid, mark with a cross (✗) the point with coordinates (−4, 3)
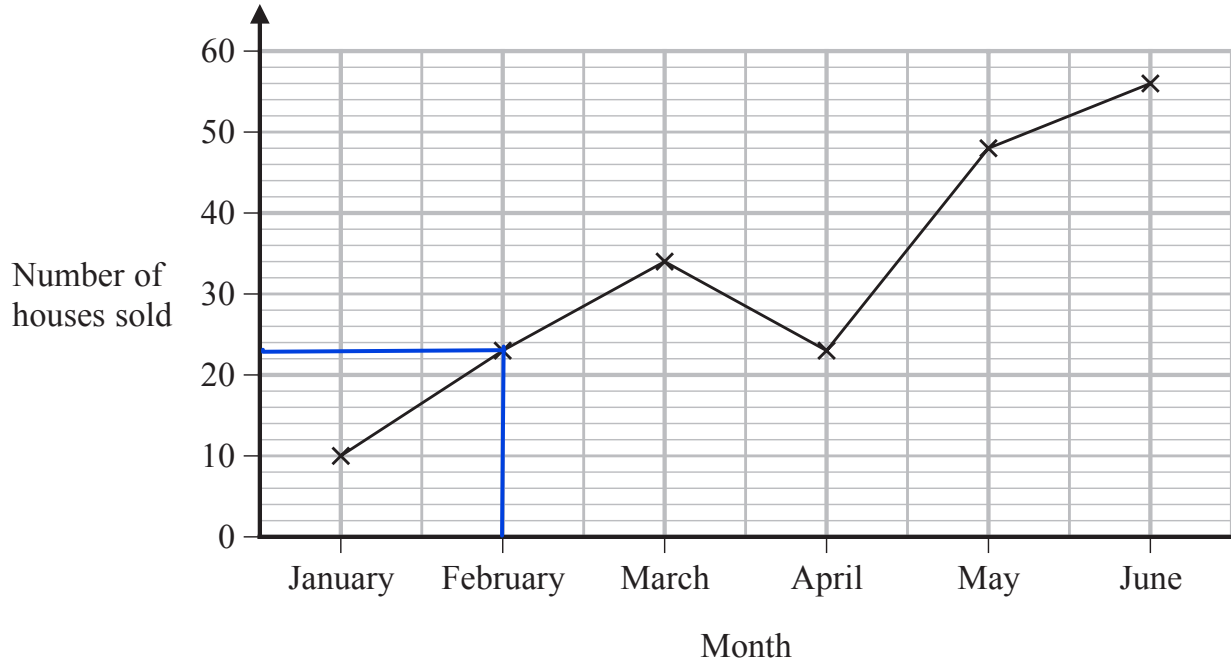Label this point *B*.

(1)

(c) On the grid, draw the circle with

centre (1, −1)
and radius 4 cm.

(2)

(Total for Question 8 is 4 marks)

9 The graph shows information about the number of houses sold by an estate agent in each of six months last year.

(a) How many houses were sold by the estate agent in February?

23

(1)

(b) For this estate agent, write down the ratio of the number of houses sold in January to the number of houses sold in June.

Houses sold in January: 10

Houses sold in June: 56

Jan : Jun

10 : 56

10:56

(2)

(Total for Question 9 is 3 marks)

5

10 Sonia wants to book a holiday.
The holiday will cost £1428

Sonia will pay a deposit of £150
She will then pay the rest of the cost in 6 equal monthly payments.

How much is each monthly payment?

Find cost minus deposit:

£1428 − £150 = £1278 ①

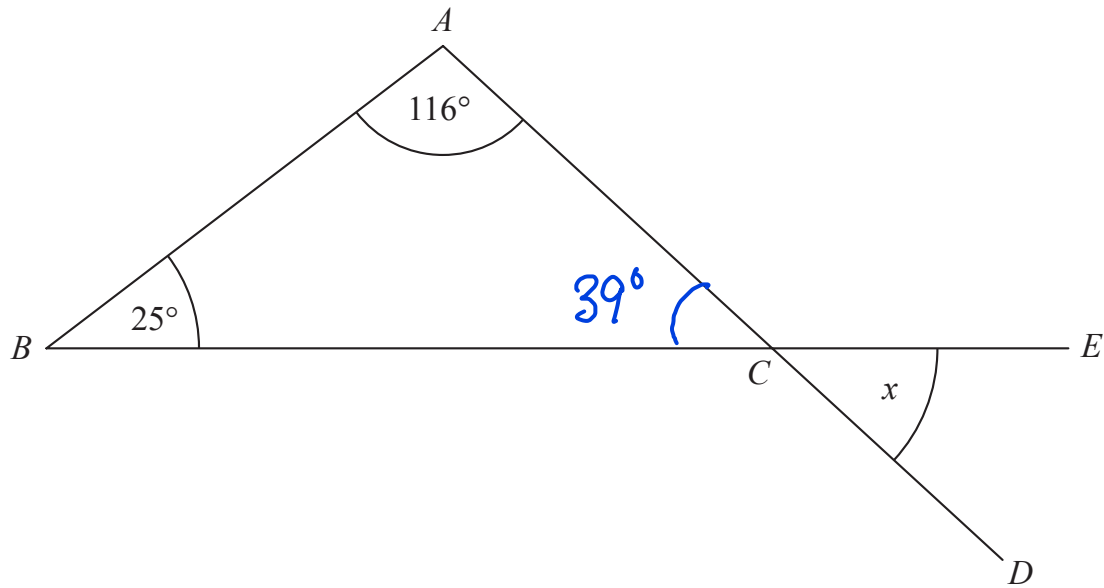She pays £1278 in 6 monthly deposits.

Each deposit is worth $\frac{£1278}{6}$ ① = £213

£ 213 ①

(Total for Question 10 is 3 marks)

6

11 The diagram shows a triangle *ABC*.

ACD and *BCE* are straight lines.

Work out the size of the angle marked *x*.
Give a reason for each stage of your working.

$\angle ACB = 180 - (116 + 25) = 39$ ① (angles in a triangle add up to $180°$)

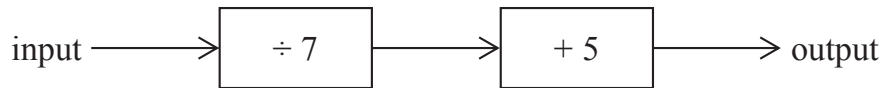$x = 39°$ ① (opposite angles are equal) ①

39 °

(Total for Question 11 is 3 marks)

12 Here is a number machine.

input $\longrightarrow$ | $\div 7$ | $\longrightarrow$ | $+ 5$ | $\longrightarrow$ output
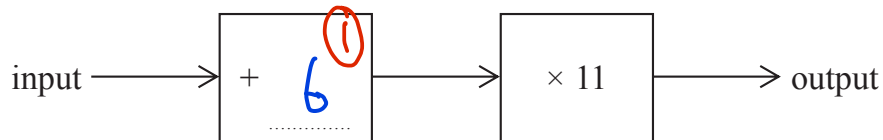
(a) Work out the output when the input is 28

$28 \div 7 = 4 \qquad 4 + 5 = 9$

9 ①

(1)

Here is a different number machine.
The number machine is not complete.

input $\longrightarrow$ | $+$ 6 ① | $\longrightarrow$ | $\times 11$ | $\longrightarrow$ output

When the input is 8, the output is 154

(b) Complete the number machine.

(2)

$8 \longrightarrow \boxed{+ \ ?} \longrightarrow 14 \longrightarrow \boxed{\times 11} \longrightarrow 154$

$\dfrac{154}{11} = 14$ ①

work backwards using the opposite operations.

$8 + \underline{\ ?\ } = 14$

$\underline{\ ?\ } = 14 - 8 = 6$

(Total for Question 12 is 3 marks)

8

13 Sophie works in a bed shop.
During the last three months she sold 198 beds. ①

② 59 beds were sold without a mattress.
③ 45 beds were double beds.
④ 17 of the single beds were sold without a mattress.
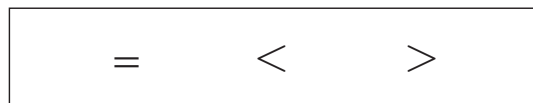⑤ 67 of the 83 king size beds were sold with a mattress.

Use this information to complete the two-way table.

	Single	Double	King size	Total
With mattress	53	19	67 ⑤	139
Without mattress	17 ④	26	16	59 ②
Total	70	45 ③	83 ⑤	198 ①

③

(Total for Question 13 is 3 marks)

14 The box below contains three mathematical symbols.

$$= \qquad < \qquad >$$

From the box, choose a symbol to make each of the following statements correct.

(i) $\dfrac{5}{8}$ ___ > ___ ① $\dfrac{2}{8}$ both fractions have the same denominator, so whichever numerator is larger is the greater fraction.

(1)

(ii) -2×-3 ___ = ___ ① $-3 + 9$

6   6

(1)

(Total for Question 14 is 2 marks)

15 The table shows information about the number of social media accounts used by each of 300 students.

Number of social media accounts	Frequency	*cumulative freq.*
0	3	*3*
1	57	*60*
2	84	*144*
3	75	*219* ←
4	81	*300*

contains the 150th element.

(a) Work out the total number of social media accounts used by these students.

Multiply the number of accounts by its frequency, then add them all up.

(0 × 3)
(1 × 57)
(2 × 84)
(3 × 75)
(4 × 81) ①
_____
+ 774

774 ①

_____ *774* ①

(2)

(b) Find the median number of social media accounts used by these students.

Median = middle value

300 students so median value is

$\frac{300}{2} = 150^{th}$ *value.* ①

_____ *3* ①

(2)

(Total for Question 15 is 4 marks)

16 On a scale drawing, a building has length 12.4 cm and width 9.4 cm.
The real length of the building is 62 metres.

Work out, in metres, the real width of the building.

Find scale factor: ①
to get from 12.4 to 62, you have to multiply by
$\frac{62}{12.4} = 5.$

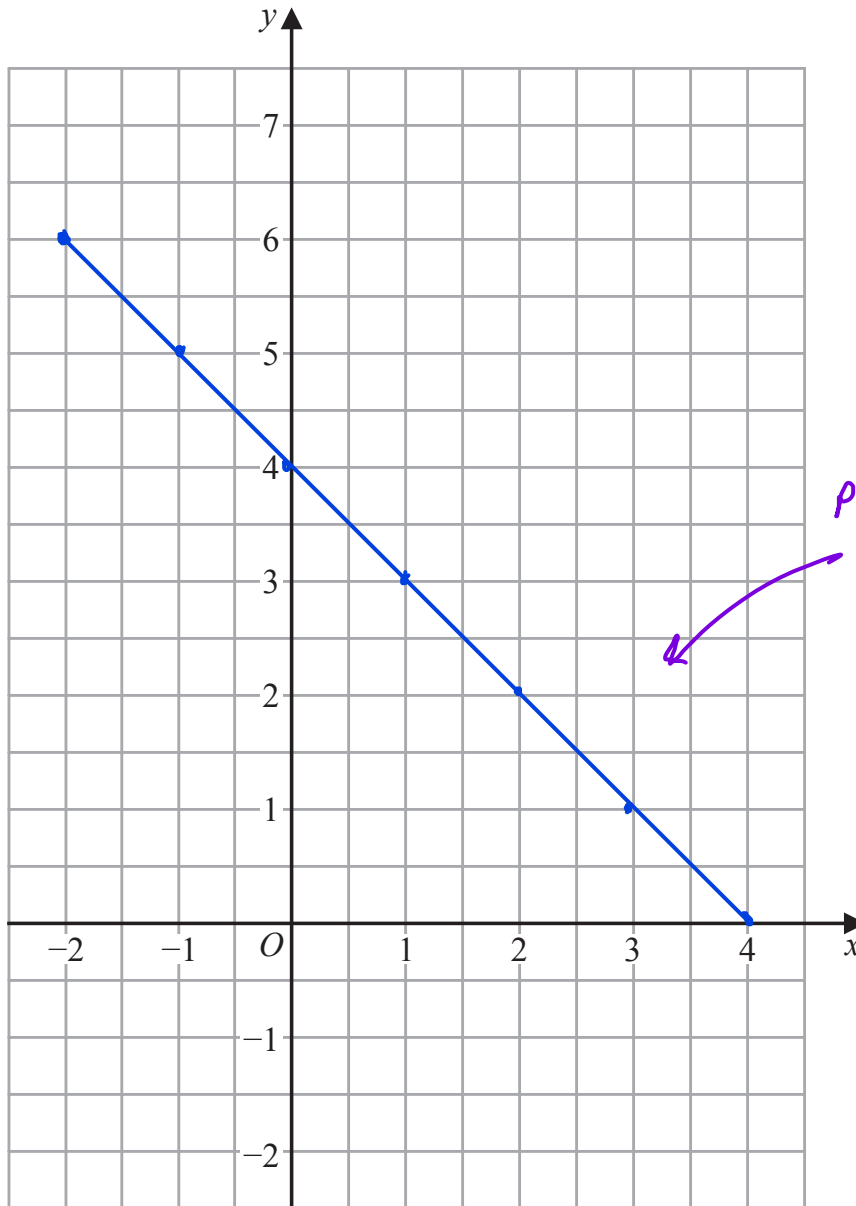*s.f. is 5. Use s.f. to convert the second measurement:* ①
9.4 × 5 = 47

_____ *47* ① metres

(Total for Question 16 is 3 marks)

10

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

x	-2	-1	0	1	2	3	4
y	6	5	4	3	2	1	0

it's often useful to draw a table of coordinate

plot all points, then connect

(3)
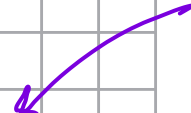
(Total for Question 17 is 3 marks)

18 This sign was in a doctor's waiting room.

> 115 appointments were missed last month.
>
> These missed appointments were a total of 25.3 hours.

Work out the mean length of time for each missed appointment.
Give your answer in minutes.

Convert 25.3 hours to minutes by ×60 ①

25.3 × 60 = 1518 minutes

∴ the sum of <u>all</u> missed appointments was 1518 minutes

for mean length:
$$\frac{1518 ①}{115} = 13.2$$

13.2 ① .... minutes

(Total for Question 18 is 3 marks)

12

19 Nimra buys a 3 kg box of sweets for £17.60

She puts the sweets into bags to sell.
Each bag contains 150 g of sweets.

Nimra fills as many bags as possible.
She will sell each bag for the same price.

Nimra wants to make a profit of at least 35%

Assuming she sells all the bags,
what is the lowest price Nimra should charge for each bag?

Find the maximum number of 150g bags she can fill with 3kg of sweets:

$$3kg = 3000g \qquad \frac{3000g}{150g} = 20 \text{ bags}$$

She can sell 20 bags. ①

Find how much money would give her a profit of 35%.

$$35\% \text{ of } £17.60 = \frac{35}{100} \times 17.6 = 6.16 ①$$

so she must make £17.60 + £6.16 = £23.76 ①
from selling the 20 bags.

∴ each bag must sell for at least

$$\frac{£23.76 ①}{20} = £1.19$$

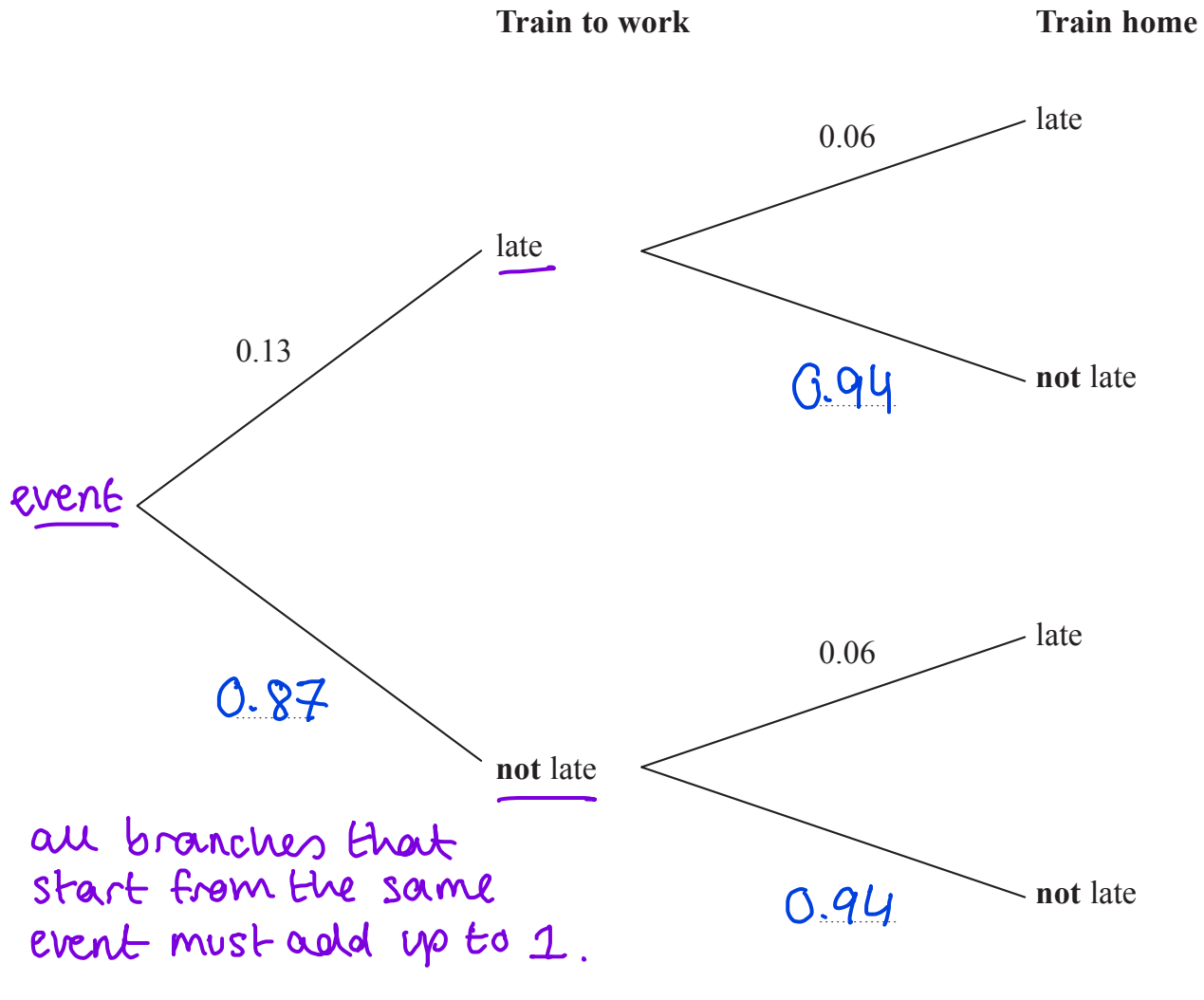£ ....1.19.... ①

(Total for Question 19 is 5 marks)

20 Lorena gets a train at the same time each morning to go to work.
She gets a train at the same time each evening to come home.

The probability tree diagram shows the probabilities of each train arriving late.

(a) Complete the probability tree diagram.

| **Train to work** | **Train home** |

late

0.06 ——— late

0.13

0.94 ——— **not** late

event

0.87

not late

0.06 ——— late

0.94 ——— **not** late ②

all branches that start from the same event must add up to 1.

(2)

For a day that Lorena goes to work,

(b) work out the probability that the train to work and the train home will both arrive late.

=

①

$0.13 \times 0.06 = 0.0078$

'and' means multiply probabilities
'or' means add probabilities

①

0.0078

(2)

(Total for Question 20 is 4 marks)

14

21 (a) Simplify $(x^3)^5$

brackets means multiply indices

$$(x^3)^5 = x^{3 \times 5} = x^{15}$$

x^{15} ①

(1)

(b) Expand and simplify $4(x + 3) + 7(4 - 2x)$

$4(x+3) + 7(4-2x)$ *distribute to all terms in the bracket* ①

$4x + 12 + 28 - 14x$

collect like terms

$40 - 10x$

$40 - 10x$ ①

(2)

(c) Factorise fully $15x^3 + 3x^2y$

find all common factors:
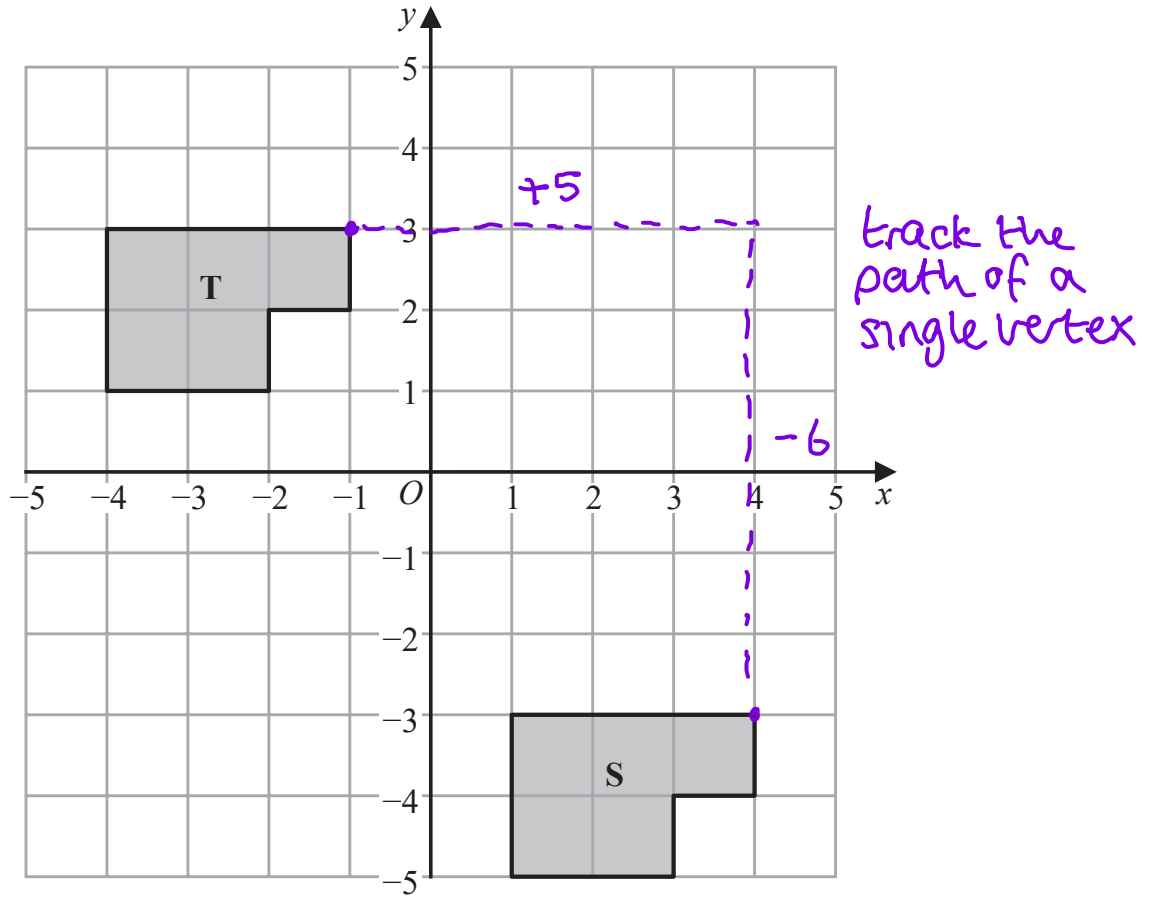*both terms are multiples of $3x^2$*

$3x^2(\_ + \_)$ ① *Find what remains after $3x^2$ has been taken out of each term.*

$3x^2(5x+y)$ ①

(2)

$3x^2(5x + y)$

(Total for Question 21 is 5 marks)

22

+5 (handwritten)

track the path of a single vertex (handwritten)

−6 (handwritten)

Describe fully the single transformation that maps shape **S** onto shape **T**.

Translation by the vector $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$ (handwritten) ① ①

(Total for Question 22 is 2 marks)

23 The length of a football pitch is 90 metres, correct to the nearest metre.

Complete the error interval for the length of the football pitch.

Interval is 90 ± half a metre (handwritten)

89 · 89.5 · 90 · 90.5 · 91 (handwritten number line)

① ①
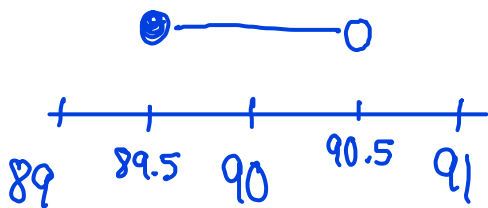
89.5 m ⩽ length < *90.5* m

(Total for Question 23 is 2 marks)

tip: 90.5 is not included as it rounds to 91, not 90 (handwritten)

16

24 Festival A will be in a rectangular field with an area of 80 000 m²
The greatest number of people allowed to attend Festival A is 425

Festival B will be in a rectangular field 700 m by 2000 m.
The greatest number of people allowed to attend Festival B is 6750

The area per person allowed for Festival B is greater than the area per person allowed for Festival A.

(a) How much greater?
Give your answer correct to the nearest whole number.

Festival A

area = 80,000 m²

max. people = 425

area per person

$= \dfrac{80,000}{425}$ ①

= 188 (nearest whole number)

Festival B ①

area = 700m × 2000m = 1,400,000 m²

max. people = 6750

area per person

$= \dfrac{1,400,000}{6750}$ ①

= 207 (nearest whole number)

Difference between area per person

= 207 - 188 = 19 ①

.... 19 .... m²

(4)

Callum says,

"300 cm² is the same as 3 m² because there are 100 cm in 1 m so you divide by 100"

Callum's method is wrong.

(b) Explain why.

There are 10,000 cm² in 1 m² ①

1 m² = 1m × 1m = 100cm × 100cm = 10,000 cm²

(1)

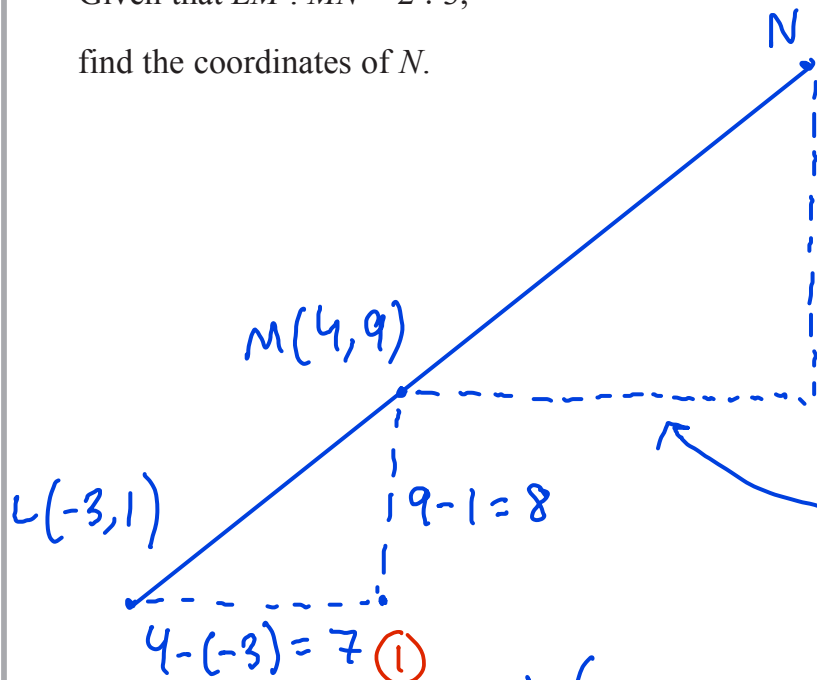**(Total for Question 24 is 5 marks)**

25 The points L, M and N are such that LMN is a straight line.

The coordinates of L are $(-3, 1)$

The coordinates of M are $(4, 9)$

Given that $LM : MN = 2 : 3$,

find the coordinates of N.

$LM : MN$

$\div 2 \left\{ \begin{array}{c} 2 : 3 \\ 1 : \frac{3}{2} \end{array} \right\} \div 2$

this means the horizontal and vertical components of MN are $\frac{3}{2}$ of those of LM.

N

$8 \times \frac{3}{2} = 12$

$M(4,9)$

$L(-3,1)$

$9 - 1 = 8$

$7 \times \frac{3}{2} = 10.5$ ①

$4 - (-3) = 7$ ①

$N\left(4 + 10.5, 9 + 12\right)$ ①

$N(14.5, 21)$

(14.5 , 21) ①

(Total for Question 25 is 4 marks)

---

26 A new phone cost £679

The value of the phone decreases at a rate of 4% per year.

Work out the value of the phone at the end of 3 years.

Decreases at a rate of 4% each year

∴ each year is 0.96 times the previous year.

this could also be done in a single step:

$673 \times 0.96^3 = 600.74$

Y1: £679 × 0.96 = £651.84 ①

Y2: £651.84 × 0.96 = £625.77 ①

Y3: £625.77 × 0.96 = £600.74 ①

£ 600.74

(Total for Question 26 is 3 marks)

18

27 In Spain, Sam pays 27 euros for 18 litres of petrol.
In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

      1 euro = £0.85
    4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

Is Sam correct?
You must show how you get your answer.

Convert Sam's 18 litres into gallons:

    4.5 litres : 1 gallon
    18 litres : 4 gallons   } ×4

scale factor: $\frac{18}{4.5} = 4$

so Sam pays for 4 gallons ①

Convert Sam's 27 euros into pounds:

    1 euro : £0.85
    27 euro : £22.95   } ×27

scale factor: 27

so Sam pays £22.95 for 4 gallons ①

Sam in Spain:
    £22.95 : 4 gallons
    £5.74 (2dp) : 1 gallon   } ÷4 ①

Leo in Wales:
    £40.80 : 8 gallons
    £5.10 : 1 gallon   } ÷8

NO, Sam is incorrect as 1 gallon costs
£5.74 in spain but £5.10 in wales, which is cheaper. ①

28 Solve the simultaneous equations

$$5x + 2y = 27$$
$$6x + 4y = 28$$

$5x + 2y = 27$ ①
$6x + 4y = 28$ ②

multiply ① by 2 to get coefficients of y equal:
① x 2: $10x + 4y = 54$ ③

$10x + 4y = 54$
$- \ \underline{6x + 4y = 28}$
$4x + 0y = 26$ "Same Sign Subtract"

$4x = 26$
$x = \dfrac{26}{4} = 6.5$ ①

substitute $x = 6.5$ into any equation,
e.g. ①:

$5(6.5) + 2y = 27$
$32.5 + 2y = 27$
$2y = 27 - 32.5 = -5.5$
$y = -\dfrac{5.5}{2} = -2.75$ ①

$x = \underline{\quad 6.5 \quad}$ ①

$y = \underline{\quad -2.75 \quad}$

(Total for Question 28 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

20