Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel International GCSE

Centre Number | Candidate Number

Wednesday 13 January 2021

Afternoon (Time: 2 hours) | Paper Reference **4MA1/2FR**

Mathematics A

Paper 2FR
Foundation Tier

You must have:
Ruler graduated in centimetres and millimetres, protractor, 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- 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.
- Check your answers if you have time at the end.

Turn over ▶

P66300A

1/1/1/

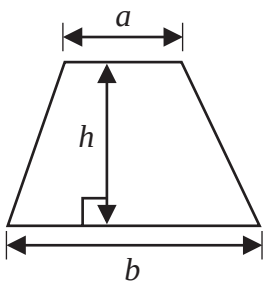
P 6 6 3 0 0 A 0 1 2 0

Pearson

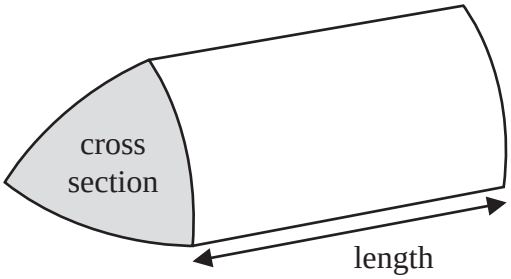
International GCSE Mathematics

Formulae sheet – Foundation Tier

Area of trapezium = $\frac{1}{2}(a + b)h$

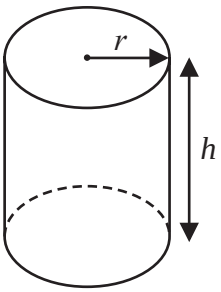


Volume of prism = area of cross section × length



Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

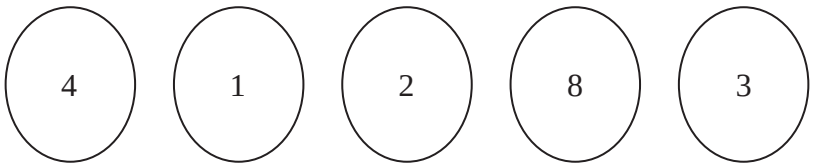


Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

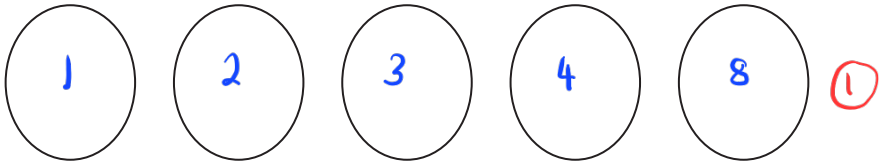
You must write down all the stages in your working.

1 Here are five discs.
Each disc has a number on it.



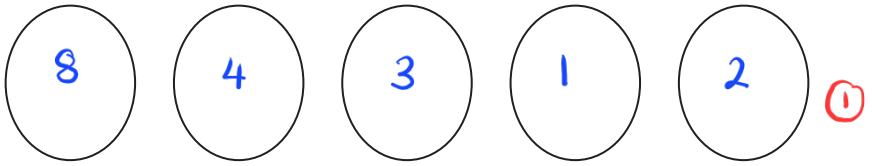
These five discs are arranged to make the number 41283

(a) Show how all five discs can be arranged to make the smallest number.



(1)

(b) Show how all five discs can be arranged to make the largest **even** number. - needs to end with even number



(1)

(c) Which of the five numbers on the discs are factors of 21?

1, 3 (2)

(2)

(d) Which of the five numbers on the discs are prime numbers?

2, 3 (2)

(2)

(Total for Question 1 is 6 marks)

2 The pictogram shows information about the number of emails Sophie received on each of four days.

Monday	⊠ ⊠ ⊠ ⊠ 4
Tuesday	⊠ ⊠ ▷ 2.5
Wednesday	⊠ ▷ 1.5
Thursday	⊠ ⊠ ⊠ ◸ 3.25
Friday	⊠ ⊠ ⊠ ▷ (1)

Key:
⊠
represents: 4 emails

(a) On which of Monday, Tuesday, Wednesday or Thursday did Sophie receive the least number of emails?

Wednesday (1)

.....

(1)

(b) Find the ratio of the number of emails Sophie received on Monday to the number of emails Sophie received on Tuesday.
Give your ratio in its simplest form.

Monday : Tuesday = 4 : 2.5 (1)
×2 ( ) ×2
8 : 5 (1)

8 : 5

.....

(2)

On Friday, Sophie received 14 emails.

(c) Show this information on the pictogram. $\frac{14}{4} = 3.5$

(1)

On Friday, 6 of the 14 emails Sophie received were from Kamil.

(d) Write 6 as a fraction of 14
Write your fraction in its simplest form.

$\frac{6 \div 2}{14 \div 2} = \frac{3}{7}$ (1) (1)

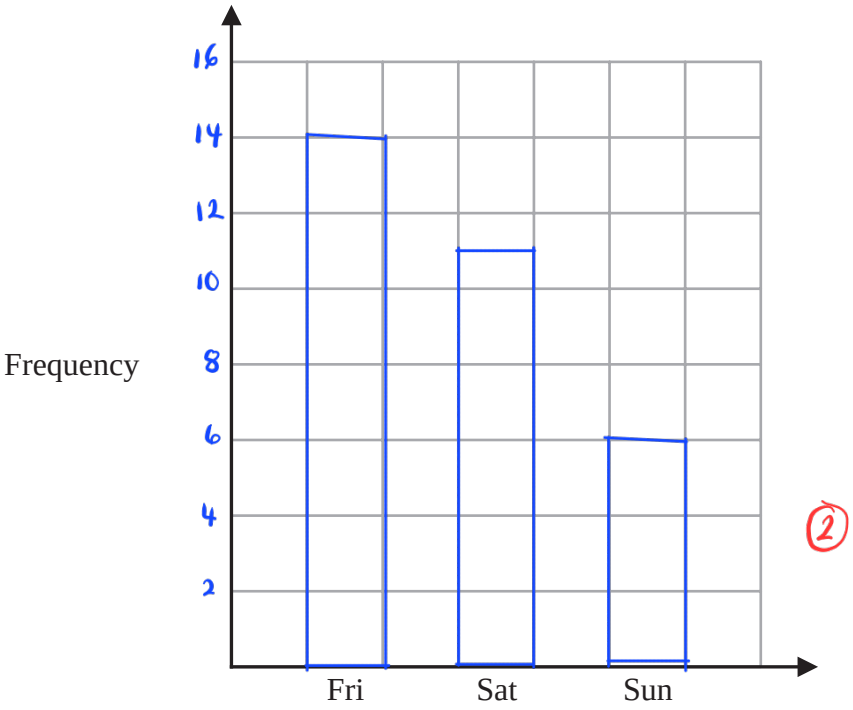
$\frac{3}{7}$

.....

(2)

On Friday, Sophie received 14 emails, on Saturday she received 11 emails and on Sunday she received 6 emails.

(e) Draw a bar chart to show the number of emails Sophie received on each of Friday, Saturday and Sunday.
Complete the frequency axis.



(2)

(Total for Question 2 is 8 marks)

3 (a) Complete the following estimates by writing a suitable metric unit on each of the dotted lines.

(i) The distance from Paris to Berlin is about 1000 ..... kilometres (km) (1)

(ii) A bucket holds about 5 ..... litres (l) ..... of water. (1)

(iii) The area of the screen of a mobile phone is about 90 ..... centimeter square (cm^2) (1)

(3)

(b) Write down an estimate for the height of a bedroom door in a house.
Use a suitable metric unit.

..... 2 (1) ..... metres (1) .....

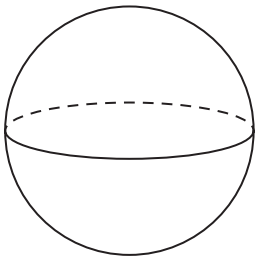
(2)

(Total for Question 3 is 5 marks)

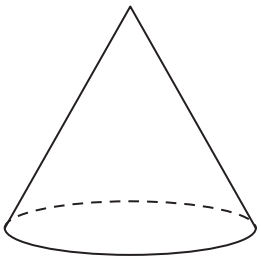
4 Here are three 3D shapes, **A**, **B** and **C**.

(a) Write down the mathematical name for each of these 3D shapes.

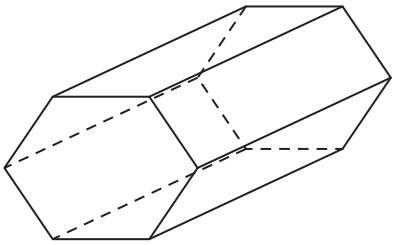
A



B



C



(i) Sphere (1)

(ii) Cone (1)

(iii) Prism (1)

(3)

(b) (i) How many faces does shape **C** have?

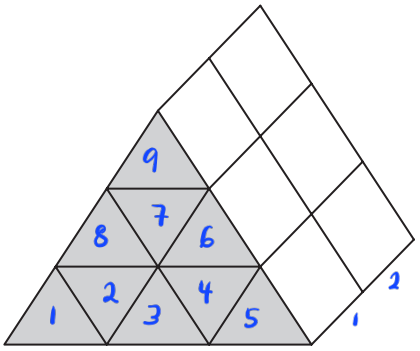
8 (1)

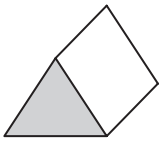
(ii) How many vertices does shape **C** have?

12 (1)

(2)

Here is a solid prism made from bricks.
The bricks are identical triangular prisms.





one brick

Diagram **NOT** accurately drawn

The volume of the prism is 54 cm^3

(c) Work out the volume of each brick.

1 prism = 2 × 9
= 18 bricks (1)

Volume of each brick : $\frac{54\ cm^3}{18}$ = 3 cm^3 (1)

3 ..... cm^3

(2)

(Total for Question 4 is 7 marks)

5 The table shows the temperature recorded in Amsterdam at 6 am on each of five days.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature (°C)	–5	–1	4	3	–6

(a) What is the range of the temperatures in the table?

range = highest - lowest

4 - (-6) = 10 (1)

(1)

10 ..... °C

(2)

(b) What is the median of the temperatures in the table?

Arrange in order:

-6, -5, -1, 3, 4 (1)

↑ median

-1 (1) ..... °C

(2)

(c) What percentage of the temperatures in the table are lower than 0 °C?

temperatures lower than 0°C : -5, -1, -6

3 out of 5 : $\frac{3}{5}$ x100% (1)

= 60% (1)

60 ..... %

(2)

On Saturday of the same week, the temperature recorded in Amsterdam at 6 am was 8 °C higher than the temperature recorded at 6 am on Friday.

(d) What was the temperature recorded in Amsterdam at 6 am on Saturday?

-6 + 8 = 2

(1) (1)

2 ..... °C

(2)

(Total for Question 5 is 8 marks)

6 Mikhal has 1200 grams of cake mixture.

He is going to make 3 cakes, cake *A*, cake *B* and cake *C*.

$\frac{4}{15}$ of the weight of the cake mixture will be used to make cake *A*.

The rest of the cake mixture will be used to make cake *B* and cake *C*.

The weight of the cake mixture used to make cake *B* and the weight of the cake mixture used to make cake *C* will be in the ratio 3 : 8

Work out the weight of the cake mixture used to make each of cake *A*, cake *B* and cake *C*.

Finding weight of cake A :

$\frac{4}{15} \times 1200 = 320$ (1)

Finding weight of cake B and C :

$1200 - 320 = 880$ (1)

Total ratio of cake B and C :

$3 + 8 = 11$

Weight of cake B : $\frac{3}{11} \times 880 = 240$ (1)

Weight of cake C : $\frac{8}{11} \times 880 = 640$ (1)

Cake *A* 320 grams

Cake *B* 240 grams

Cake *C* 640 grams

(Total for Question 6 is 4 marks)

7 Here are five times, in a single day, using the 24-hour clock.

A	B	C	D	E
11 53	15 20	08 20	18 12	16 45
11·53 am	3·20 pm	8·20 am	6.12 pm	4·45 pm

(a) Write down the letter of the time nearest to 6 pm

D (1)

.....

(1)

(b) Work out the difference, in hours and minutes, between time **A** and time **E**.

15 105
~~16~~ ~~45~~
− 11 53
4 52 = 4 hours 52 minutes

1 hour = 60 minutes

(2)

4 hours 52 minutes

(2)

Francesco uses the rule below to find the time, in minutes, to cook a chicken in his oven.

Number of minutes to cook a chicken
Multiply the weight of the chicken, in kg, by 40 and then add 15

The clock on Francesco's oven shows time **B**.
Francesco starts cooking a chicken at this time.
He stops cooking the chicken when the clock on his oven shows time **E**.

(c) Work out the weight of the chicken.

E − B : 16 45 − 15 20
= 1 hour 25 minutes
= 85 minutes (1)

85 minutes = (weight × 40) + 15

weight = $\frac{85 - 15}{40}$ = 1.75 kg (1) (1)

1.75 kg

(3)

(d) Use Francesco's rule to write down a formula for the time, T minutes, to cook a chicken of weight k kilograms.

$T = 40k + 15$

$T = 40k + 15$ (2)

.....

(2)

(Total for Question 7 is 8 marks)

8 In Berlin, a watch costs 120 euros.
In Dubai, the same model of watch costs 600 dirhams.

The currency exchange rates are

Exchange rates
£1 = 1.16 euros
1 dirham = 0.24 euros

Calculate the difference between the cost of the watch in Berlin and the cost of the same model of watch in Dubai.
Give your answer in pounds (£) correct to 2 decimal places.

Berlin : $\frac{120}{1.16} = 103.45$ (1)

Dubai : $\frac{600 \times 0.24}{1.16} = 124.14$ (1)

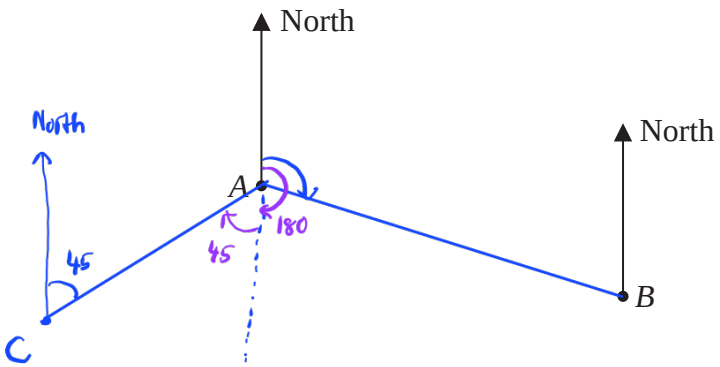
Difference : $124.14 - 103.45$ (1)

$= 20.69$ (1)

£ 20.69

(Total for Question 8 is 4 marks)

9 The scale diagram shows the positions of a post office (A) and a police station (B) in a town.



(a) Measure the bearing of B from A.

107 (1) °

.....

(1)

The town hall is at a position C.
The bearing of A from C is 045°

(b) Calculate the bearing of C from A.

180° + 45° = 225° (1)
(1)

225 °

.....

(2)

(Total for Question 9 is 3 marks)

10 Here is a list of ingredients needed to make 24 currant buns.

Ingredients for 24 currant buns	
100 grams	butter
70 grams	sugar
140 grams	flour
40 grams	currants
30 millilitres	milk
2	eggs

Gina wants to make 60 currant buns.

(a) Work out the weight of butter Gina needs.

Butter for 1 bun : $\frac{100\text{ g}}{24} = 4.167\ldots\text{ g}$

Butter for 60 buns : $4.167\ldots\text{ g} \times 60$ (1)

$= 250\text{ g}$ (1)

250 grams

(2)

Hans wants to make 30 currant buns.

(b) Find the percentage increase in the weight of butter needed to make 30 currant buns rather than 24 currant buns.

Butter for 30 buns : $4.167\ldots \times 30$

$= 125\text{ g}$

Percentage increase : $\frac{125 - 100}{100} \times 100\%$ (1)

$= 25\%$ (1)

25 %

(2)

(Total for Question 10 is 4 marks)

11 $w = 5y^2 - y^3$

(a) Work out the value of w when $y = -2$

$w = 5(-2)^2 - (-2)^3$ (1)

$= 5(4) - (-8)$

$= 20 + 8$

$= 28$ (1)

$w =$ 28

(2)

(b) Factorise fully $8p^2 - 2p$

$2p(4p - 1)$ (2)

$2p(4p - 1)$

(2)

(c) Expand $4t(3t - 2)$

$= 12t^2 - 8t$ (2)

$12t^2 - 8t$

(2)

(d) Expand and simplify $(5x - 2)(x + 4)$

$= 5x^2 + 20x - 2x - 8$ (1)

$= 5x^2 + 18x - 8$ (1)

$5x^2 + 18x - 8$

(2)

(Total for Question 11 is 8 marks)

12 The diagram shows a rectangle *ABCD* and a semicircle with diameter *AB* where *AB* = 12 cm. The point *E* lies on *DC* and also on the semicircle.

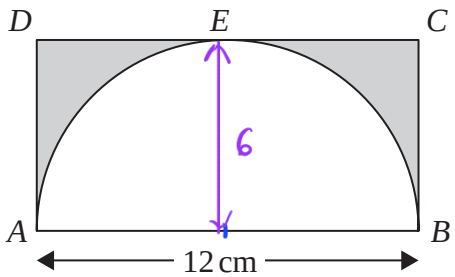


Diagram **NOT** accurately drawn

radius = 6 cm

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

Area of rectangle : $12 \times 6 = 72$ cm^2 (1)

Area of semicircle : $\frac{1}{2} \times \pi \times 6^2 = 56.54$ cm^2

Area of shaded region = Area of rectangle − Area of semicircle

: 72 cm$^2 - 56.54$ cm^2 (1)

: 15.5 cm^2 (1)

15.5 cm^2

(Total for Question 12 is 3 marks)

13 Solve $5(2x - 3) = 20$
Show clear algebraic working.

$10x - 15 = 20$ (1)

$10x = 20 + 15$

$10x = 35$ (1)

$x = \frac{35}{10}$

$= 3.5$ (1)

$x =$ 3.5

(Total for Question 13 is 3 marks)

14 $\mathscr{E} = \{21, 22, 23, 24, 25, 26, 27, 28, 29, 30\}$
$A = \{22, 24, 26, 28, 30\}$
$B = \{21, 24, 27, 30\}$

(a) List the members of the set

(i) $A \cap B$ - is in set A AND set B

24, 30 (1)

(ii) A' - not in set A

21, 23, 25, 27, 29 (1)

(2)

$C = \{23, 25, 29\}$ - all not in set A or set B

(b) Using set notation, find an expression for C in terms of A and B.

$(A \cup B)'$ (1)

(1)

(Total for Question 14 is 3 marks)

15 (a) Simplify $(3k^2)^4$

$3^4 \times k^{2\times4}$

$= 81 \times k^8$

$= 81k^8$

$81k^8$ (2)

(2)

(b) Simplify $(21m^4n) \div (3n^{-5})$

$(21 \div 3) \times (m^4) \times (n \div n^{-5})$

$= 7 \times m^4 \times (n^{1-(-5)})$

$= 7 \times m^4 \times n^6$

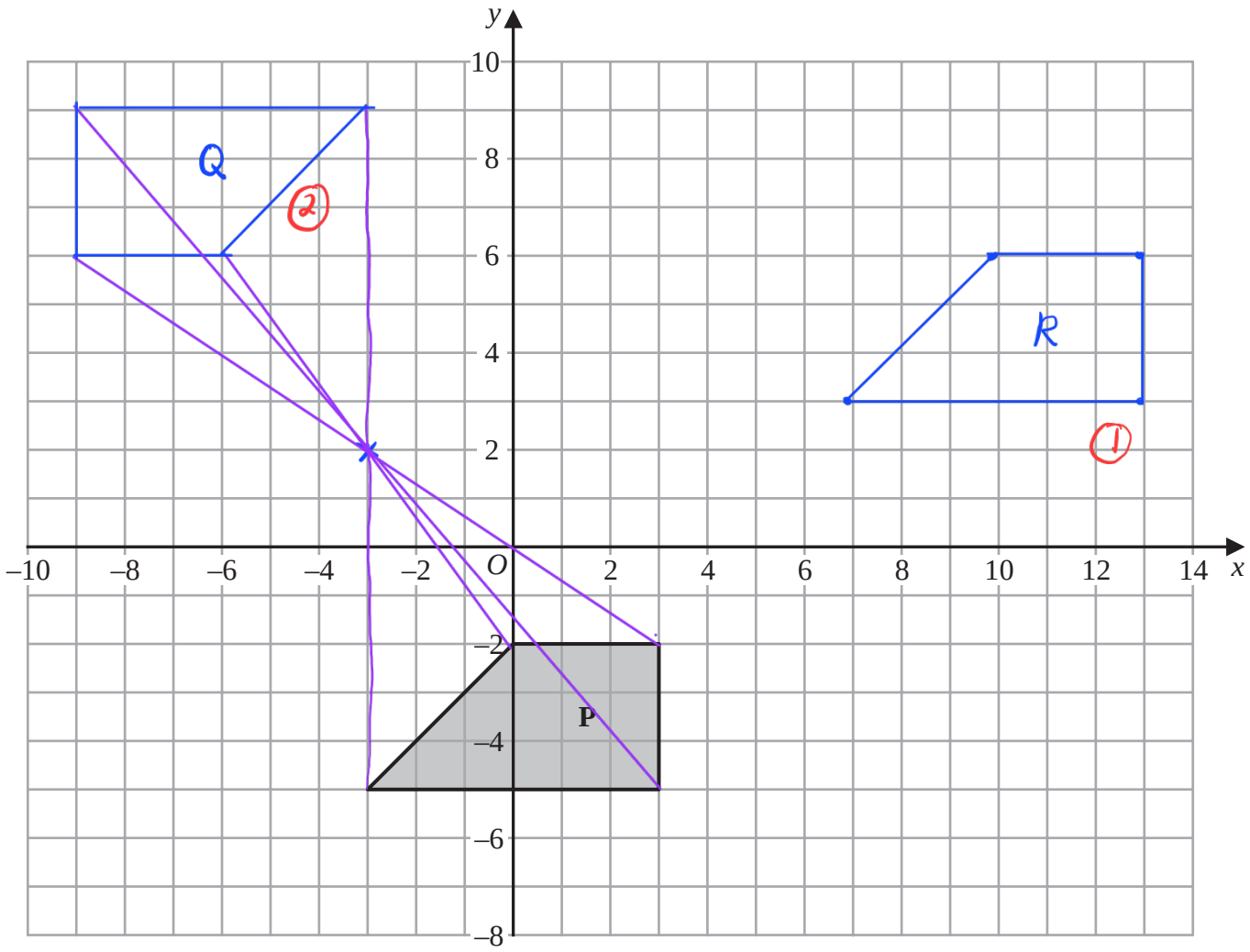
$= 7m^4n^6$

$7m^4n^6$ (2)

(2)

(Total for Question 15 is 4 marks)

16 Here is a shape **P** drawn on a grid of squares.



(a) On the grid, rotate shape **P** 180° about the point (–3, 2)
Label the new shape **Q**.

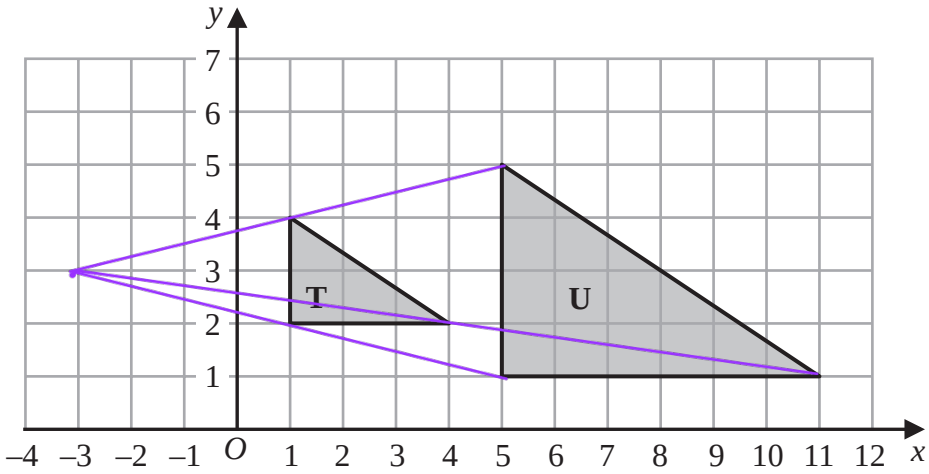
(2)

(b) On the grid, translate shape **P** by the vector $\begin{pmatrix} 10 \\ 8 \end{pmatrix}$ 10 position to the right, 8 position upwards

Label the new shape **R**.

(1)

Here are triangle **T** and triangle **U** drawn on a grid of squares.



(c) Describe fully the single transformation that maps triangle **T** onto triangle **U**.

Enlargement of scale factor 2 at centre (-3, 3)
(1) (1) (1)

(3)

(Total for Question 16 is 6 marks)

17 On Wednesday, the price of 1 litre of petrol was £1.26
The price of petrol on Wednesday was 5% more than the price of petrol on the previous Monday.

Calculate the price of 30 litres of petrol on the previous Monday.

Let the price of 1 litre petrol on Monday = x

$$x + \frac{5}{100}x = 1.26$$

$$1.05x = 1.26$$

$$x = \frac{1.26}{1.05}$$

$$= 1.2 \quad (1)$$

Price of 30 litres of petrol on Monday:

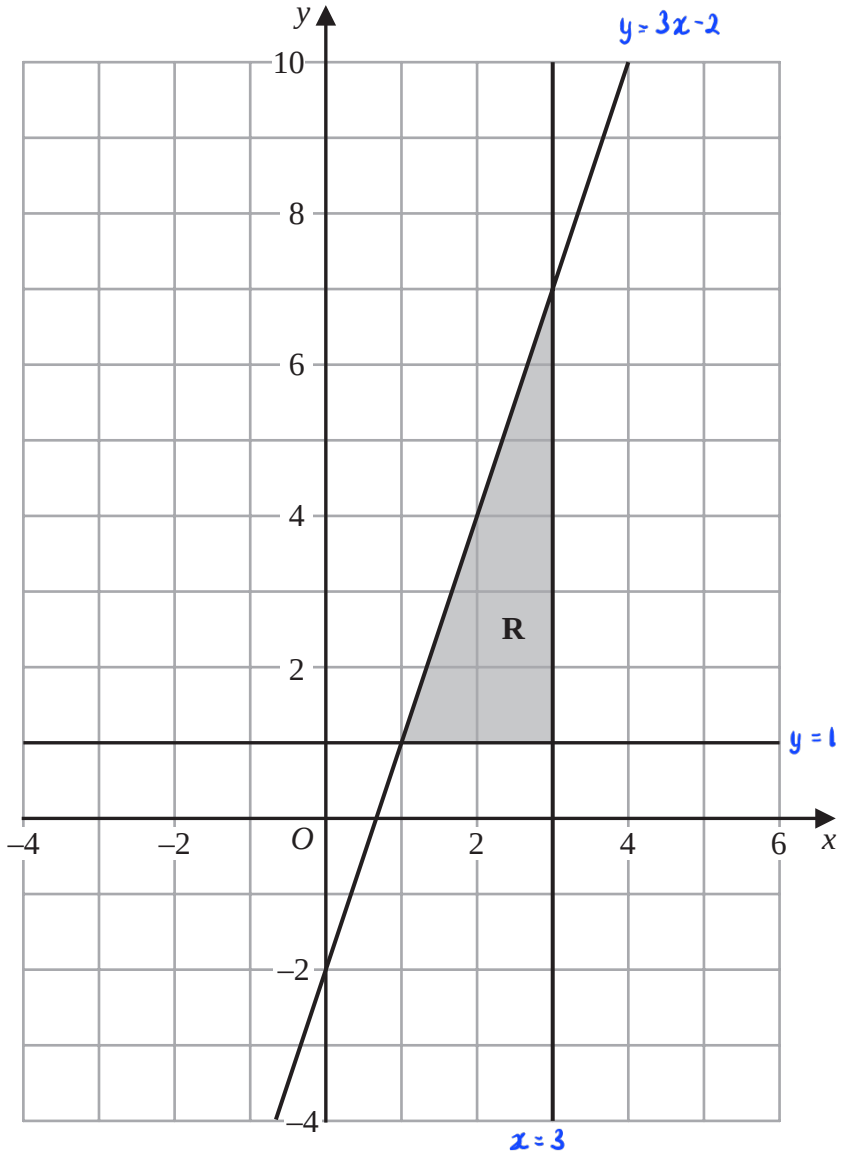
$1.2 \times 30 = 36$ (1)
(1)

£ 36

(Total for Question 17 is 3 marks)

18 The shaded region **R**, shown in the diagram below, is bounded by the straight line with equation $y = 3x - 2$ and by two other straight lines.

Write down the three inequalities that define region **R**.



$x \leqslant 3$ (1)

$y \geqslant 1$ (1)

$y \leqslant 3x - 2$ (1)

(Total for Question 18 is 3 marks)

19 The table gives the length of the coastline, in kilometres, of each of five oceans.

Ocean	Length of coastline (km)
Arctic	4.539×10^4
Atlantic	1.119×10^5
Pacific	1.357×10^5
Indian	6.653×10^4
Southern	1.797×10^4

11.19×10^4

13.57×10^4

(a) Which ocean has the greatest length of coastline?

Pacific (1)

.....

(1)

(b) Calculate the difference between the length of the Atlantic Ocean's coastline and the length of the Southern Ocean's coastline.
Give your answer in standard form.

$11.19 \times 10^4 - 1.797 \times 10^4$ (1)

$= (11.19 - 1.797) \times 10^4$

$= 9.393 \times 10^4$ (1)

9.393×10^4 km

(2)

(Total for Question 19 is 3 marks)

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20 Solve $x^2 - 21x + 20 = 0$
Show your working clearly.

By using quadratic formula:

$$x = \frac{21 \pm \sqrt{(-21)^2 - 4(1)(20)}}{2}$$ (1)

$$= \frac{21 \pm \sqrt{361}}{2}$$

$$= \frac{21 \pm 19}{2}$$ (1)

$$= \frac{21 + 19}{2} \text{ or } \frac{21 - 19}{2}$$

$$= \frac{40}{2} \text{ or } \frac{2}{2}$$

$x = 20$ or 1 (1)

20, 1

(Total for Question 20 is 3 marks)

21 A mathematics teacher at a school asked a group of students how far, in kilometres, each student had travelled to get to school that day.

The table gives information about their answers.

Distance travelled (d km)	Number of students
$0 < d \leqslant 2$	x
$2 < d \leqslant 4$	11
$4 < d \leqslant 6$	8
$6 < d \leqslant 8$	6
$8 < d \leqslant 10$	5

The teacher calculated that an estimate for the mean distance travelled by the whole group of students was 4.25 km.

Work out the value of x.
Show your working clearly.

Estimated mean $= \dfrac{(x \times 1) + (11 \times 3) + (8 \times 5) + (6 \times 7) + (5 \times 9)}{x + 11 + 8 + 6 + 5} = 4.25$ (1)

$= \dfrac{x + 33 + 40 + 42 + 45}{x + 30} = 4.25$

$160 + x = 4.25(30 + x)$ (1)

$160 + x = 127.5 + 4.25x$

$160 - 127.5 = 4.25x - x$

$32.5 = 3.25x$ (1)

$x = \dfrac{32.5}{3.25}$

$= 10$ (1)

$x =$ 10

(Total for Question 21 is 4 marks)

TOTAL FOR PAPER IS 100 MARKS