Candidate surname

Other names

Pearson Edexcel
International GCSE

Centre Number

Candidate Number

Wednesday 15 January 2020

Morning (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.
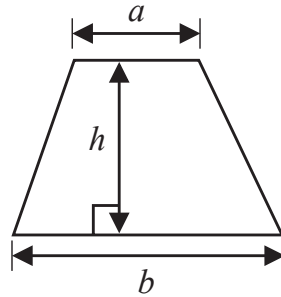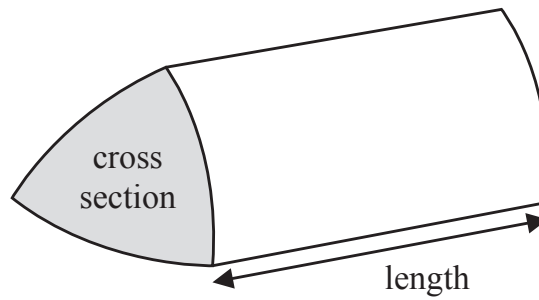- Check your answers if you have time at the end.

Turn over ▶

Pearson

International GCSE Mathematics

Formulae sheet – Foundation Tier
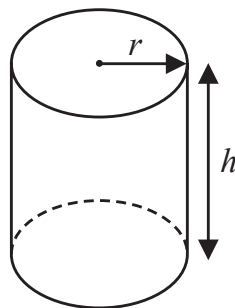
Area of trapezium $= \dfrac{1}{2}(a + b)h$

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 SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1 (a) Write in figures the number **seventy thousand, two hundred and sixteen**.

70216 ①

(1)

(b) Write down a common factor of 20 and 30

factor of 20 : ①,②, 4 ,⑤,⑩, 20

factor of 30 : ①,②, 3 ,⑤, 6 ,⑩, 15 , 30

1, 2, 5, 10 ①

(1)

(c) Write down a square number that is between 20 and 40

1, 4, 9 , 16 ,㉕,㊱, 49

36 ①

(1)

(d) Find the cube root of 3375

$\sqrt[3]{3375}$ = 15

15 ①

(1)

(e) Write brackets in the following calculation so that the answer is correct.

$$42 - 6 \div (6 - 3) = 40$$

①

(1)

(Total for Question 1 is 5 marks)

2 Egor rolled a dice 24 times.
Here are his results.

2	3	5	4	6	2
1	3	3	5	1	3
3	5	5	6	2	5
4	3	4	3	3	4

(a) Complete the frequency table for Egor's results.

Number on dice	Tally	Frequency
1	II	2
2	III	3
3	IIII III	8
4	IIII	4
5	IIII	5
6	II	2

②

(2)

(b) Write down the mode of the numbers that Egor rolled.

mode : number with most frequency

3 ①

(1)

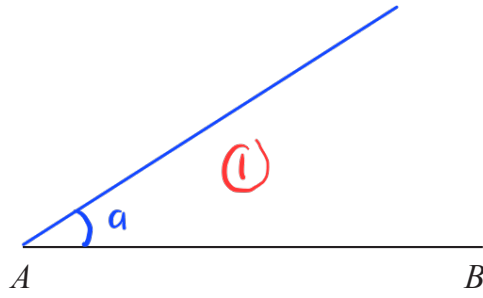Egor thinks the dice he rolled is biased.

(c) Give a reason why the results could show that the dice is biased.

The dice lands on 3 too many times. ①
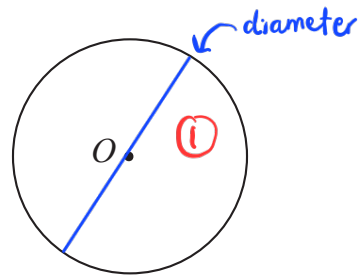
(1)

(Total for Question 2 is 4 marks)

4

3 The diagram shows a line *AB*.

a ①

A   *B*

(a) At the point *A* draw an acute angle.
Label your acute angle *a*.

(1)

The diagram shows a circle with centre *O*.

diameter ①

O

(b) Draw a diameter of the circle.

(1)

(Total for Question 3 is 2 marks)

4 Here is a shape made from squares.

1	2	3	4	5
6	7	8	9	10
11				

(a) What fraction of this shape is shaded?

$\frac{11}{15}$ ①

(1)

(b) Write $\frac{23}{5}$ as a mixed number.

$$5\overline{)23} \quad \overset{4}{\phantom{5\overline{)2}}} \quad = 4\frac{3}{5}$$
$$-\underline{20}$$
$$3$$

$4\frac{3}{5}$ ①

(1)

(c) Write 0.23 as a fraction.

$\frac{23}{100}$ ①

(1)

(d) Write $\frac{2}{5}$ as a decimal.

0.4 ①

(1)

(e) Write these decimals in order of size.
Start with the smallest decimal.

3.61   3.9   3.555   3.82   3.7

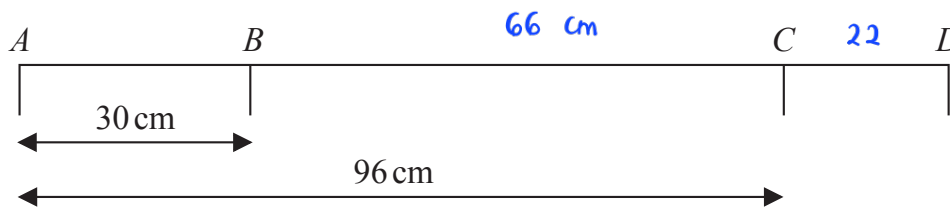3.555, 3.61, 3.7, 3.82, 3.9 ①

(1)

(Total for Question 4 is 5 marks)

5

A   *B*   66 cm   *C*   22   *D*

30 cm

96 cm

Diagram **NOT** accurately drawn

In the diagram, *A*, *B*, *C* and *D* are points on a straight line.

$AB = 30$ cm $AC = 96$ cm $BC = 3CD$

Work out the length of *AD*.

$BC = AC - AB$

$= 96 - 30$

$= 66$ cm ①

$BC = 3CD$

$66 = 3CD$

$CD = \dfrac{66}{3}$

$= 22$ cm

$AD = AC + CD$

$= 96 + 22$ ①

$= 118$ cm ①

118 .... cm

(Total for Question 5 is 3 marks)

---

6   Diego left home on Tuesday at 07 50
He arrived home on the same Tuesday at 17 35

Work out the length of time that Diego was away from home on Tuesday.
Give your answer in hours and minutes.

$0750 \rightarrow 1750 = 10$ hours

$1750 - 1735 = 15$ minutes

×60

hour   minutes

÷60

Diego was away for :

10 hours − 15 minutes

$= 9$ hours 45 minutes ②

9 .... hours   45 .... minutes

(Total for Question 6 is 2 marks)

7 *P, Q* and *R* are three points marked on a grid.
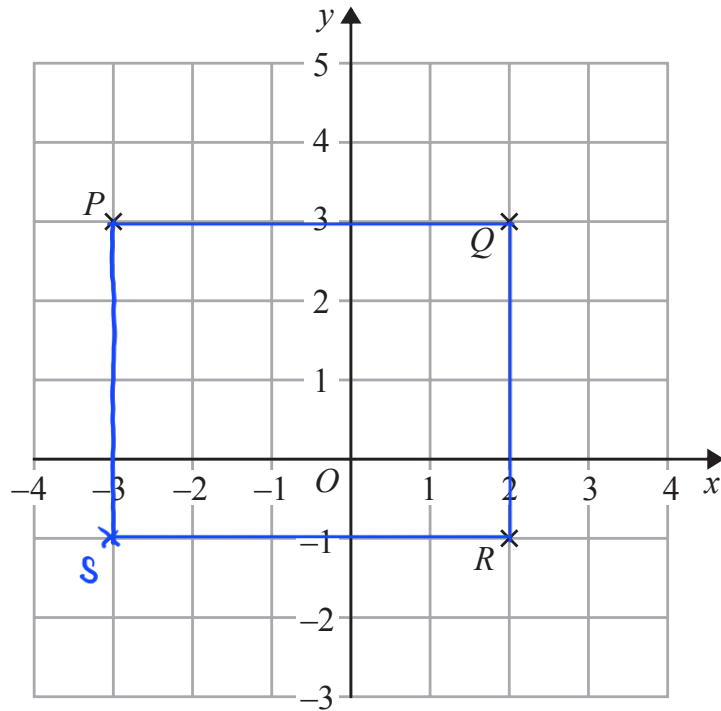
(a) Write down the coordinates of point *Q*.

(2 , 3)
(1)

S is the point such that *PQRS* is a rectangle.

(b) Find the coordinates of point *S*.

(-3 , -1)
(1)

(c) Find the coordinates of the midpoint of *PR*.

$P(-3,3)$, $R(2,-1)$

$\text{midpoint } PR = \left(\dfrac{-3+2}{2} , \dfrac{3+(-1)}{2} \right)$

$= (-0.5, 1)$

(-0.5 , 1)
(2)

(Total for Question 7 is 4 marks)

8 Lin has 60 bricks.
He puts his 60 bricks into a bag.

Some information about the 60 bricks is shown in the two-way table.

	orange	blue	yellow	Total
small	6	7	14	27
large	13	16	4	33
Total	19	23	18	60

③

(a) Complete the two-way table.

(3)

One of the bricks is taken at random from the bag.

(b) Write down the probability that this brick is blue.

$\frac{23}{60}$ ①

(1)

Lin now puts all his large bricks into a sack.
He takes at random a large brick from the sack.

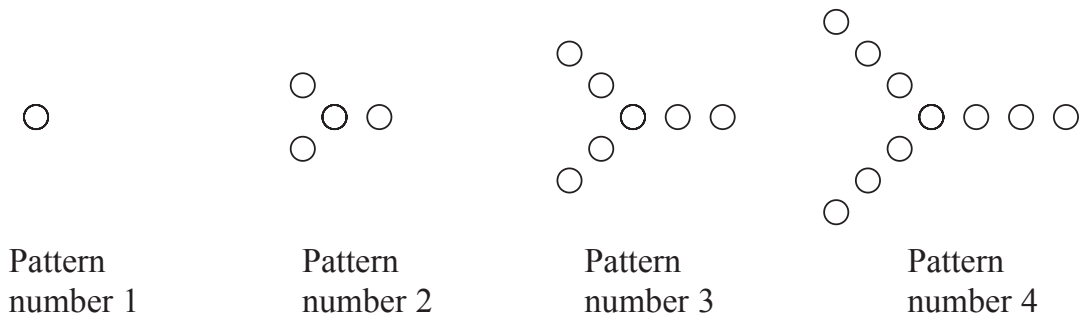(c) Write down the probability that this large brick is orange.

Total large sack = 33

Orange large sack = 13

$= \frac{13}{33}$ ②

$\frac{13}{33}$

(2)

(Total for Question 8 is 6 marks)

9 Here is a sequence of patterns made from circles.

Pattern number 1   Pattern number 2   Pattern number 3   Pattern number 4

(a) In the space below, draw Pattern number 5

①
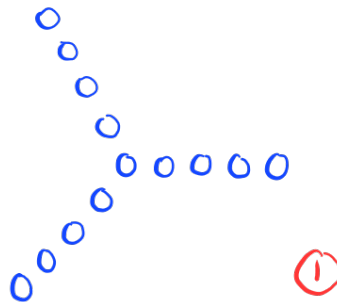
(1)

(b) Complete the table.

Pattern number	1	2	3	4	5	6
Number of circles	1	4	7	10	13	16

①

(1)

(c) Work out the number of circles in Pattern number 8

7 = 16 + 3
  = 19

8 : 19 + 3
  = 22 ①

22

(1)

C is the number of circles in Pattern number *P*

(d) Write down a formula for *C* in terms of *P*

$C = 3P - 2$ ②

$C = 3P - 2$

(2)

A different sequence of patterns is made from triangles.
The rule to find the number of triangles in each pattern is

multiply the Pattern number by 5 and subtract 4

(e) Is there a pattern in this sequence that is made from exactly 136 triangles?
You must give a reason for your answer.

Let x = number of pattern

$136 = 5x - 4$

$5x = 140$

$x = \dfrac{140}{5}$

$= 28$ ①

∴ Yes, Pattern 28 has 136 triangles

(1)

(Total for Question 9 is 6 marks)

10 Here are four different numbers written in order of size.

$$3 \qquad 6 \qquad m \qquad n$$

The range of the four numbers is 13
The median of the four numbers is 8.5

Find the value of m and the value of n.

median $= \dfrac{6+m}{2} = 8.5$

$6 + m = 17$

$m = 11$

range $= n - 3 = 13$

$n = 16$

$m =$ 11 ①

$n =$ 16 ①

(Total for Question 10 is 2 marks)

11

11

1 euro = 9.3 Hong Kong dollars (HKD)
1 euro = 4.4 dirham (AED)

(a) Change 400 euros to Hong Kong dollars.

$400 \times 9.3 = 3720$ ①

3720 .... HKD

(1)

(b) Change 418 dirham to euros.

$\dfrac{418}{4.4} = 95$ ①

95 .... euros

(1)

(c) Change 651 Hong Kong dollars to dirham.

HKD to euro : $\dfrac{651}{9.3} = 70$ ①

euro to dirham : $70 \times 4.4 = 308$ ①

308 ....AED

(2)

(Total for Question 11 is 4 marks)

12 (a) Simplify $k + k + k + k$

$4k$ ①

(1)

$$f = 9 \times 9 \times 9 \times 9$$

(b) (i) Write f as a single power of 9

$9^{1+1+1+1} = 9^4$

9^4 ①

(1)

(ii) Write f as a single power of 3
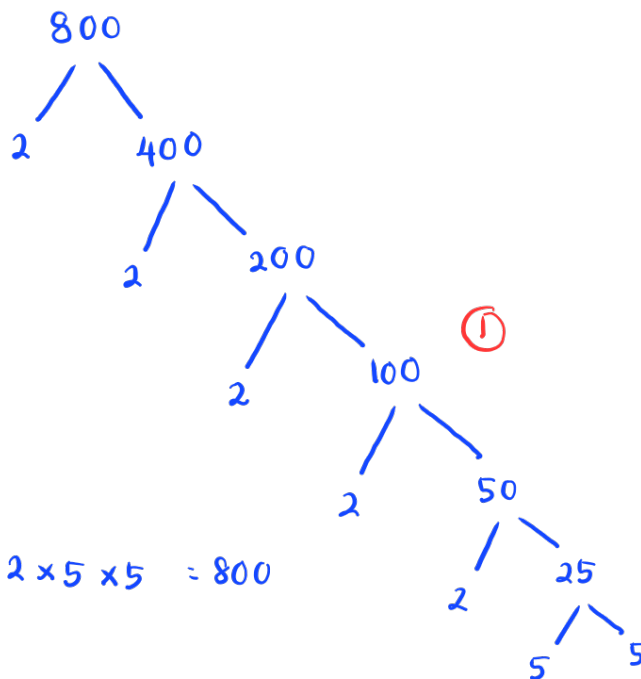
$9 = 3^2$

$f = (3^2)^4$

$= 3^{2 \times 4} = 3^8$

3^8 ①

(2)

(c) Write $5^{17} \times 5^2$ as a single power of 5

$5^{17+2} = 5^{19}$

5^{19} ①

(1)

(d) Write 800 as a product of its prime factors.
Show your working clearly.

800
2   400
  2   200
    2   100 ①
      2   50
        2   25
          5   5

$2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5 = 800$

$2 \times 2 \times 2 \times 2 \times 2 \times 5 \times 5$ ①

(2)

(Total for Question 12 is 6 marks)

13 Betsy was given $75 for her birthday.

She saved some of the money and spent the rest on a T-shirt and a bag.

Betsy saved 40% of the $75
She spent $12 more on the bag than she spent on the T-shirt.

Work out how much Betsy spent on the bag.

Money Betsy saved :

$$\frac{40}{100} \times 75 = 30 \quad ①$$

Money she spent on bag and T-shirt :

$$75 - 30 = 45 \quad ①$$

Money she spent on bag :

Let money spent on bag $= x$

$$x + (x - 12) = 45 \quad ①$$
$$2x - 12 = 45$$
$$2x = 57$$
$$x = 28.5 \quad ①$$

$ ......28.5..............................

(Total for Question 13 is 4 marks)
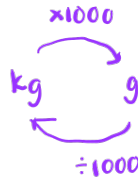
14 Iona buys a box of cereal.

The cereal in the box weighs 0.75 kg.
Each helping of the cereal eaten by Iona has a weight of 40 g.

(a) Write 40 g as a fraction of 0.75 kg.
Give your answer in its simplest form.

$$0.75 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 750 \text{ g}$$

$$\frac{40 \text{ g}}{750 \text{ g}} = \frac{4}{75}$$

$$\frac{4}{75}$$

(2)

The cereal in the box contains 6.8 g of protein for each 100 g of cereal.

(b) Work out the amount of protein in each of Iona's helpings of cereal.

$$\frac{40}{100} \times 6.8 \text{ g} = 2.72 \text{ g}$$

2.72 .... g

(2)

3 g of every 40 g helping of cereal is fat.

(c) Write 3 g as a percentage of 40 g.

$$\frac{3}{40} \times 100\% = 7.5\%$$

7.5 .... %
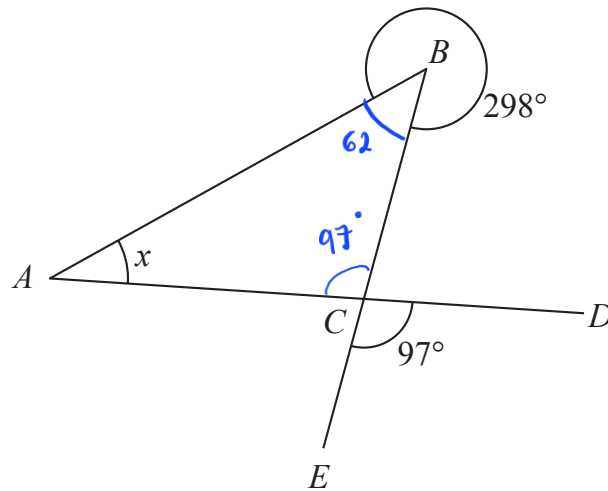
(2)

(Total for Question 14 is 6 marks)

15

Diagram **NOT** accurately drawn

ABC is a triangle.
D and *E* are points such that *ACD* and *BCE* are straight lines.

reflex angle *ABC* = 298°
angle *ECD* = 97°

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

- angle ACB = angle ECD = 97° ①
  (vertically opposite angles are equal) ①

- angle ABC = 360° − 298°
  = 62°
  (angles around a point adds up to 360°) ①

- x = 180° − 62° − 97°
  = 21° ①
  (angles in a triangle sums up to 180°)

$x =$ ____21____ °

(Total for Question 15 is 4 marks)

16 The table gives information about the amount of money, in £, that Fiona spent in a grocery store each week during 2019

Amount spent (£x)	Frequency
$0 \leqslant x < 20$	5
$20 \leqslant x < 40$	11
$40 \leqslant x < 60$	8
$60 \leqslant x < 80$	19
$80 \leqslant x < 100$	9

Work out an estimate for the total amount of money that Fiona spent in the grocery store during 2019

Total estimation : ∑ midpoint × frequency for all classes

Total = (10 × 5) + (30 × 11) + (50 × 8) + (70 × 19) + (90 × 9) ①

= 50 + 330 + 400 + 1330 + 810 ①

= 2920 ①

£ ......2920......

(Total for Question 16 is 3 marks)

17 Three tins, *A*, *B* and *C*, each contain buttons.

Tin *A* contains *x* buttons.
Tin *B* contains 4 times the number of buttons that tin *A* contains.
Tin *C* contains 7 fewer buttons than tin *A*.

The total number of buttons in the three tins is 137

Work out the number of buttons in tin *C*.

$A = x$

$B = 4x$ ①

$C = x - 7$

$Total = A + B + C$

$= x + 4x + (x-7) = 137$ ①

$= 6x = 137 + 7$

$6x = 144$

$x = \dfrac{144}{6} = 24$ ①

$C = 24 - 7$

$= 17$ ①

17

(Total for Question 17 is 4 marks)

18 (a) Expand $e(3e - 5)$

$3e^2 - 5e$ ①

(1)

(b) Factorise $35 + 5f$

$5(7 + f)$ ①

(1)

(c) Simplify $(4pq^2)^3$

$= 4^3 \times p^3 \times (q^2)^3$

$= 64 \times p^3 \times q^{2 \times 3}$ ①

$= 64 p^3 q^6$ ①

$64 p^3 q^6$

(2)

(Total for Question 18 is 4 marks)

19 The diagram shows a rectangle and a diagonal of the rectangle.
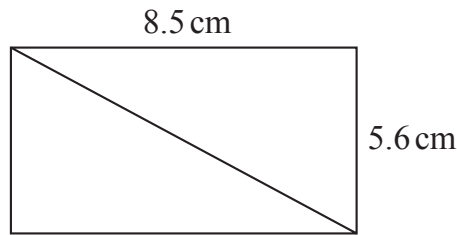
8.5 cm

Diagram **NOT** accurately drawn

5.6 cm

Work out the length of the diagonal of the rectangle.
Give your answer correct to 1 decimal place.

Using Pythagoras' theorem :

$$\text{diagonal} = \sqrt{8.5^2 + 5.6^2} \quad ①$$

$$= \sqrt{103.61} \quad ①$$

$$= 10.2 \quad ①$$

10.2 .... cm

(Total for Question 19 is 3 marks)

20 A plane takes 3 hours 36 minutes to fly from the Cayman Islands to New York.
The plane flies a distance of 2470 km.

Work out the average speed of the plane in km/h.
Give your answer correct to the nearest whole number.

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$36 \text{ minutes} \times \frac{1 \text{ hour}}{60 \text{ minutes}} = 0.6 \text{ hour} \quad ①$$

×60

hour → minutes

÷60

$$\text{speed} = \frac{2470 \text{ km}}{3.6 \text{ h}} \quad ①$$

$$= 686 \text{ km/h} \quad ①$$

686 .... km/h

(Total for Question 20 is 3 marks)

21 Solve the simultaneous equations

$$3x + 5y = 6$$
$$7x - 5y = -11 \, —①$$

$x = \dfrac{6-5y}{3} \, —②$

Show clear algebraic working.

Substitute ② into ① :

$$7\left(\frac{6-5y}{3}\right) - 5y = -11$$

$$7(6 - 5y) - 15y = -33$$

$$42 - 35y - 15y = -33 \quad \Big) -42$$

$$-50y = -33 - 42$$

$$-50y = -75 \, ①$$

$\div 50$

$$y = \frac{-75}{-50} = 1.5 \, ①$$

$$x = \frac{6 - 5(1.5)}{3}$$

$$= -0.5 \, ①$$

$x =$ .... -0.5

$y =$ 1.5

(Total for Question 21 is 3 marks)

---

22 Hamish buys a new car for $20\,000$
The car depreciates in value by 19% each year.

Work out the value of the car at the end of 3 years.
Give your answer to the nearest $.

Value of the car each year $= 100\% - 19\%$

$= 81\%$ (from the value at the start of each year) ①

Value of the car at the
end of year 3 $\quad = 20\,000 \times \left(\dfrac{81}{100}\right)^3 \, ①$

$= 10\,629 \, ①$

$\$$ .... $10\,629$

(Total for Question 22 is 3 marks)

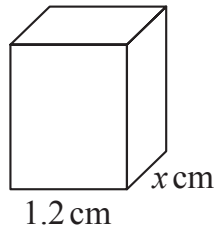**23** The diagram shows a box in the shape of a cuboid.

Diagram **NOT** accurately drawn

x cm

1.2 cm

The box is put on a table.
The face of the box in contact with the table has length 1.2 metres and width x metres.

The force exerted by the box on the table is 27 newtons.
The pressure on the table due to the box is 30 newtons/m²

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the value of x.

Area of the base of the box :

1.2 x m²

$30 \text{ N/m}^2 = \frac{27 \text{ N}}{1.2x \text{ m}^2}$ ①

$1.2x = \frac{27}{30}$

$1.2 \ x = 0.9$

$x = \frac{0.9}{1.2}$ ①

$= 0.75$ ①

$x = $ _____ 0.75

(Total for Question 23 is 3 marks)

24 The table shows information about the surface area of each of the world's oceans.

Ocean	Surface area in square kilometres
Pacific	1.56×10^8
Indian	6.86×10^7
Southern	2.03×10^7
Arctic	1.41×10^7
Atlantic	1.06×10^8

(a) Write 1.56×10^8 as an ordinary number.

156000000 ①

156 000 000

(1)

(b) Which ocean has the least surface area?

Arctic ①

(1)

(c) Work out the difference, in square kilometres, between the surface area of the Atlantic Ocean and the surface area of the Indian Ocean.
Give your answer in standard form.

Atlantic : 1.06×10^8 = 10.6×10^7 ①

Indian : 6.86×10^7

$10.6 \times 10^7 - 6.86 \times 10^7$

= $(10.6 - 6.86) \times 10^7$

= 3.74×10^7 ①

3.74×10^7 square kilometres

(2)

(Total for Question 24 is 4 marks)

25 (a) Write down the integer values of x that satisfy the inequality $-2 < x \leqslant 4$

<div align="right">

−1, 0, 1, 2, 3, 4 ②

</div>

(2)

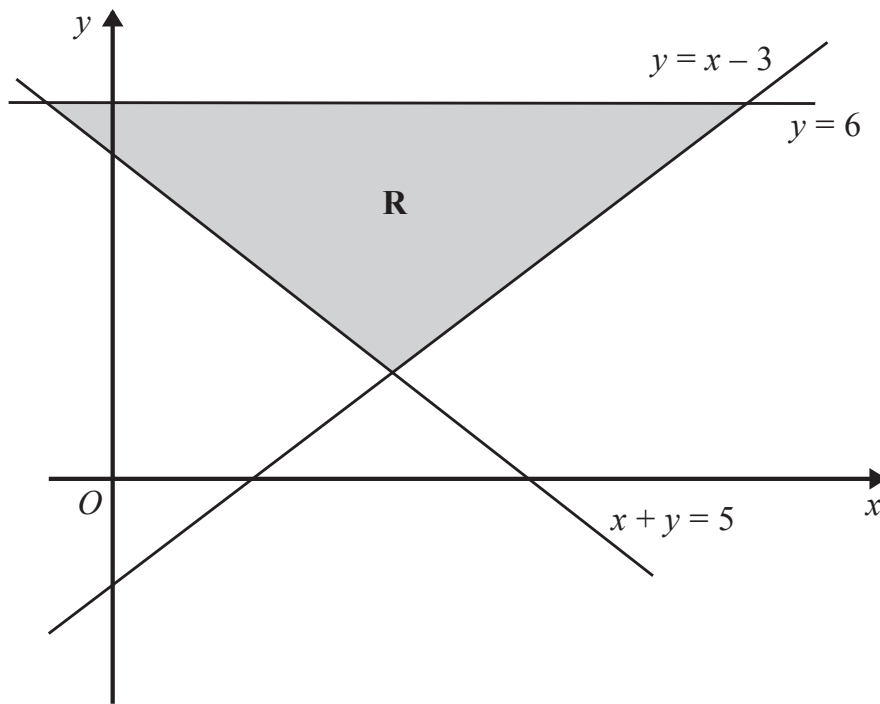The region **R**, shown shaded in the diagram, is bounded by three straight lines.

Diagram **NOT** accurately drawn

(b) Write down the three inequalities that define the region **R**.

<div align="right">

$y \leqslant 6$

$x + y \geqslant 5$ ②

$y \geqslant x - 3$

</div>

(2)

(Total for Question 25 is 4 marks)

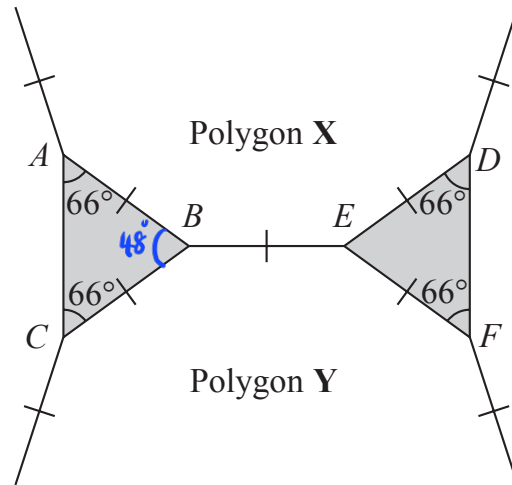**26** The diagram shows two congruent isosceles triangles and parts of two congruent regular polygons, **X** and **Y**.

Diagram **NOT** accurately drawn

Polygon **X**

A 66° B E 66° D

48°

66° 66°

C F

Polygon **Y**

The two regular polygons each have n sides.

Work out the value of n.

angle $ABC = 180° - 66° - 66°$
$\qquad = 48°$ ①

Half of angle ABC = exterior angle of polygon X and Y
$\qquad = \frac{1}{2} \times 48° = 24°$

Exterior angle of polygon $= \dfrac{360°}{\text{no. of sides}}$

$24° = \dfrac{360°}{n}$

$n = \dfrac{360°}{24°}$ ①

$\qquad = 15$ ①

$n = \underline{\quad 15 \quad}$

(Total for Question 26 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS