Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE MATHEMATICS

F

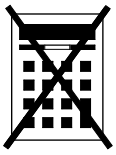
Foundation Tier Paper 1 Non-Calculator

Tuesday 19 May 2020 Morning Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments.

You must **not** use a calculator.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
TOTAL	

Please note that these worked solutions have neither been provided nor approved by AQA and may not necessarily constitute the only possible solutions. Please refer to the original mark schemes for full guidance.

Any writing in blue indicates what must be written in the exam.

Anything written in green in a rectangle doesn't have to be written in the exam.

If you find any mistakes or have any requests or suggestions, please send an email to curtis@cgmaths.co.uk

Answer **all** questions in the spaces provided.

Do not write outside the box

1 Here are some numbers.

5	5	8	13	14	15	17

Circle the range.

[1 mark]

5 11 (12) 13

Range = largest - smallest = 17 - 5

2 Circle the value of the digit 5 in 256 934

[1 mark]

5000 (50 000) 500 000 50

The 5 is in the 10000s place

3 Work out $-2 - 5$

Circle your answer.

[1 mark]

(−7) −3 3 7

Subtracting from a negative makes it more negative

Do not write outside the box

4 What is 680 millimetres in centimetres?

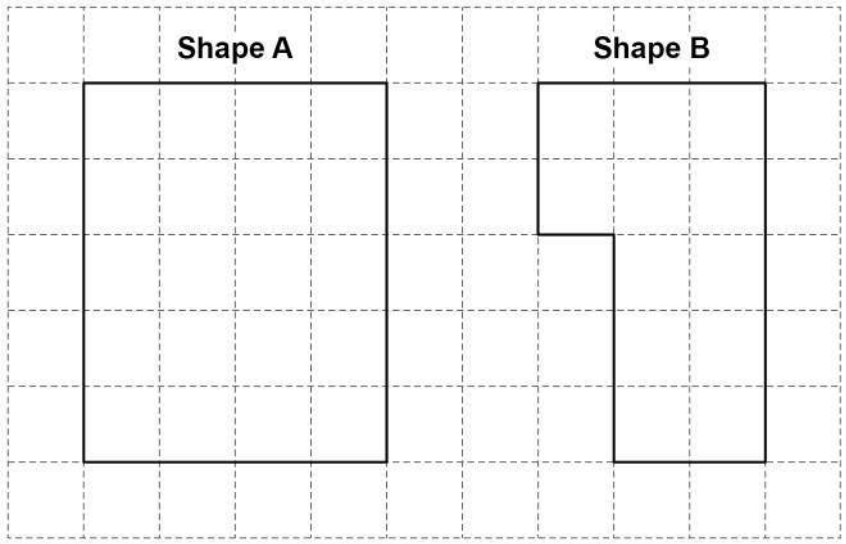
Circle your answer.

[1 mark]

0.68 cm 6.8 cm 68 cm 6800 cm

There are 10mm in 1cm. So dividing 680 by 10 converts it to centimetres. To do this, take off a 0

5



Work out area of Shape A : area of Shape B

Give your answer in its simplest form.

[2 marks]

20:12 ← Counting the squares in both shapes finds that the area of A is 20 and the area of B is 12

Answer 5 : 3

Both sides of the ratio are divided by 4 to simplify it as much as possible

6

Do not write outside the box

6 (a) Samir and Dan run a race.

Samir finishes in $2\frac{1}{2}$ minutes.

Dan finishes in 130 seconds.

Complete the following sentence.

[2 marks]

Dan wins by 20 seconds.

60X2=120 ← This works out that there are 120 seconds in 2 minutes. There are 60 seconds in a minute

30
2|60 ← This works out that there are 30 seconds in 1/2 a minute

120
+30 ← Adding the 120 seconds and the 30 seconds works out that there are 150 seconds in $2^{1}/_{2}$ minutes
150
-130 ← Subtracting the 130 seconds from the 150 seconds works out that the difference between Samir's time and Dan's time is 20 seconds
20

6 (b) Alice does a sponsored walk.

She starts from home on Monday at 8 am

She arrives back home 55 hours later.

Work out when she arrives back home.

[2 marks]

55
-24
31 ← Keep subtracting 24 until we can't subtract any more 24s. Every 24 hours is one day. So 55 hours is 2 days and there are 7 hours left over
-24
7

Day Wednesday

Time 3pm

7 hours after 8:00 is 15:00, which is 3pm. 2 days after Monday is Wednesday

Do not write outside the box

7 Work out $(43 \times 8) - (234 \div 6)$

[3 marks]

$43 \times 8 = 344$ (2)

$234 \div 6 = 39$

The order of operations, BIDMAS, needs to be followed.
So everything in the brackets is worked out first

$344 - 39 = 305$

Then the results are subtracted

Answer 305

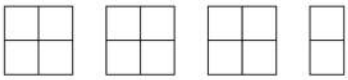
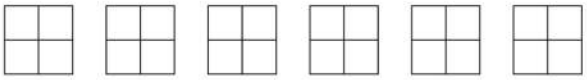
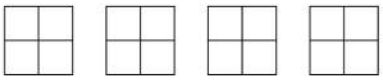
Turn over for the next question

7

Do not write outside the box

8 Here is some information, by ticket type, about the number of people visiting a cinema one week.

Key:  represents 40 people

Adults	
Students	
Children	

8 (a) How many children visited the cinema?

[1 mark]

40×4 ← There are 4 full symbols for the children, each one representing 40 people

Answer 160

8 (b) How many **more** students than adults visited the cinema?

[2 marks]

40×2=80 ← This works out that 2 symbols is worth 80 people

40÷2 ← This works out that 1/2 a symbol is worth 20 people

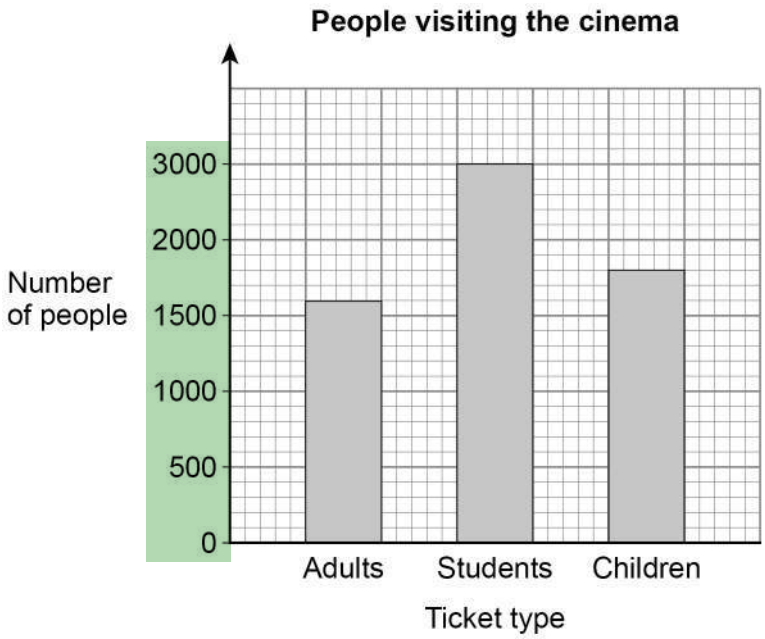
80+20 ← There are $2^1/_2$ more symbols for students than for adults. Adding the 80 and 20 works out that $2^1/_2$ symbols represents 100 people

Answer 100

Do not write outside the box

8 (c) A bar chart is drawn to show the number of people visiting the cinema one month.

Ticket type	Number of people
Adults	1600
Students	3000
Children	1800



Give **one** criticism of the bar chart.

[1 mark]

2500 is missing from the scale ← The scale goes up in 500s but goes straight from 2000 to 3000

4

Turn over ►

Do not write outside the box

9 Harry will pay income tax if he earns more than £12 500 in a year.

After 8 months he has earned a **total** of £7600

For the rest of the year he earns £1200 each month.

Will he pay income tax?

You **must** show your working.

[3 marks]

12-8 ← There are 10 months in a year. Subtracting the 8 months from 12 months works out that the rest of the year is 4 months

1200×4 ← Multiplying the £1200 each month by the 4 months in the rest of the year works out that for the rest of the year he earns £4800

```
  7600
+ 4800
-------
 12400
```

← Adding what he earned in the first 8 months and what he earned in the next 4 months works out that he earned £12400 in the whole year

NO ← £12400 is less than £12500 so he will not have to pay income tax

10 x is a 2-digit whole number.

How many digits does the number $10x$ have?

Circle your answer.

[1 mark]

cannot tell 2 (3) 4

Any 2-digit whole number multiplied by 10 will have a 0 put on the end so will have 3 digits

Do not write outside the box

11 (a) Circle the answer to 50×0.2

[1 mark]

1 (10) 100 1000

5 x 2 = 10. The 50 is 10 times greater than 5 and the 0.2 is 10 times less than 2. Both of these effects cancel out so 50 x 0.2 is also 10

11 (b) Work out $3.65 \div 5$

Give your answer as a decimal.

[2 marks]

$$5\overline{)3.^{3}6\,'5} \quad 0.73$$

← Short division can be used

Answer 0.73

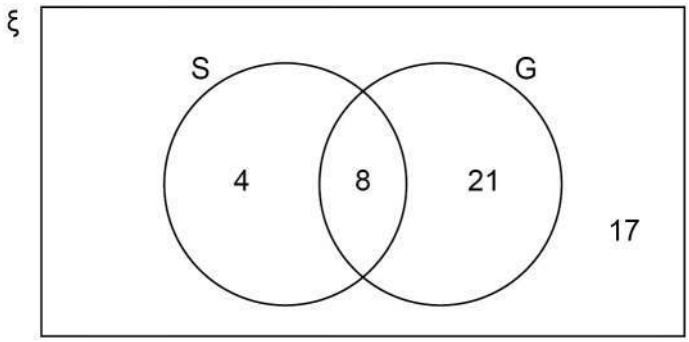
Turn over for the next question

7

Do not write outside the box

12 The Venn diagram shows information about 50 people who are in bands.

S = singers G = guitar players



12 (a) How many of the people are guitar players?

[1 mark]

Answer 29

Both the 8 and the 21 are in the guitar ring. 8 + 21 = 29

12 (b) How many of the people are singers but **not** guitar players?

[1 mark]

Answer 4

4 are in the singer ring which are not in the guitar ring

12 (c) One of the people is chosen at random.

Write down the probability that the person is

not a singer

and

not a guitar player.

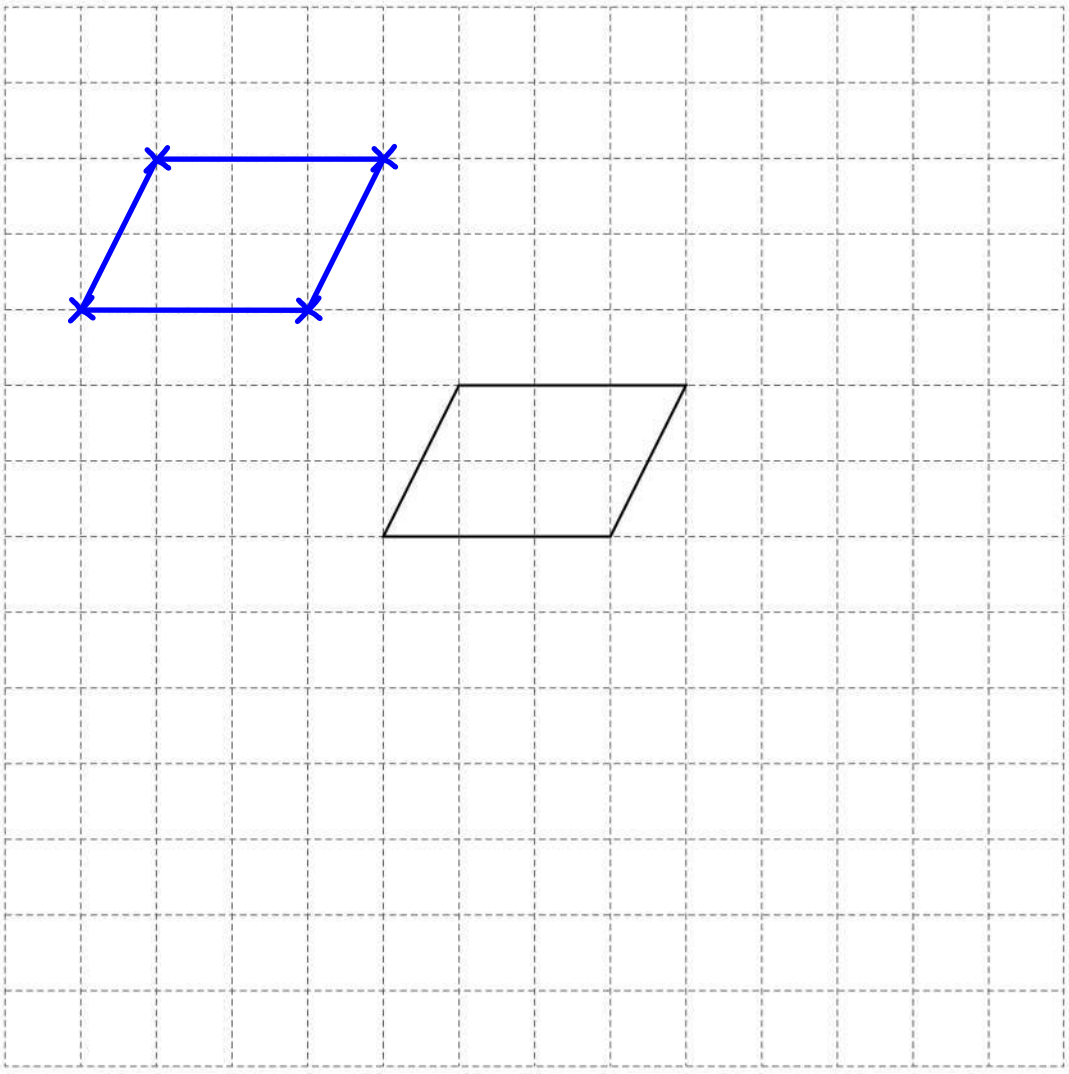
[1 mark]

Answer $\frac{17}{50}$

17 out of the 50 people are not a singer and are not a guitar player

Do not write outside the box

13 Here is a parallelogram.



The parallelogram is translated 4 squares to the left and 3 squares up.

Draw the translated parallelogram.

[2 marks]

Move each corner 4 to the left and 3 up then join up the corners

5

Do not write outside the box

14 (a) Solve $6x - 11 = 13$

[2 marks]

$6x = 24$ ← Adding 11 to both sides gets the x term on its own

$x =$ 4

Dividing both sides by 6 gets x on its own

14 (b) Simplify fully $(2 \times 4a) + 9 + \frac{15a}{3} - 7$

[3 marks]

$8a + 9 + 5a - 7$ ← 2 x 4a = 8a. 15a/3 = 5a

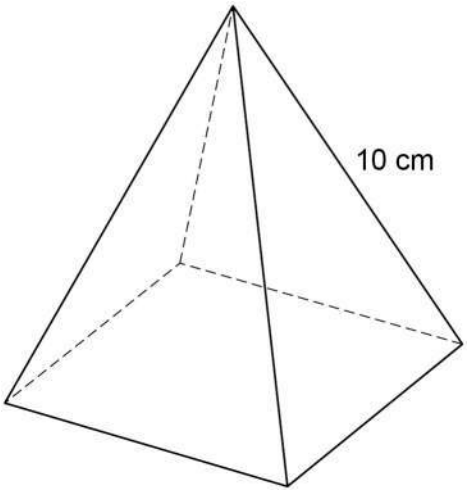
Answer $13a + 2$

Collecting like terms. 8a + 5a = 13a. 9 - 7 = 2

Do not write outside the box

15 A pyramid has a square base.

Each of the four sloping edges has length 10 cm



The total length of all eight edges is 68 cm

Work out the **area** of the square base.

[4 marks]

10 × 4 ← Multiplying the 10 cm by 4 works out that the total length of the four sloping edges is 40 cm

68 − 40 ← Subtracting the total length of the four sloping edges from the total length of all eight edges works out that the total length of the four edges of the square are 28 cm

28 ÷ 4 ← Dividing the total length of the four edges of the square by 4 works out that each edge of the square is 7 cm

7^2 ← Area of square = length^2

Answer 49 cm^2

7 x 7 = 49

9

Do not write outside the box

16 The table shows information about how 150 students travel to school.

	Walk	Bus	Car	
Girls	22	33	17	Total = 72
Boys	24	41	13	Total = 78

16 (a) What fraction of the **girls** walk to school?

Give your answer in its simplest form.

[2 marks]

$\frac{22}{72}$ ← 22 out of the 72 girls walk to school

Answer $\frac{11}{36}$

The fraction simplifies by dividing the numerator and denominator by 2. It cannot go any simpler as they cannot be divided any further without giving decimals

16 (b) One of the **boys** is chosen at random.

What is the probability that the boy travels to school by bus?

[1 mark]

Answer $\frac{41}{78}$

41 out of the 78 boys travel to school by bus

Do not write outside the box

16 (c) What percentage of the 150 **students** travel to school by car?

[2 marks]

17
+13
30

Adding the 17 girls and the 13 boys who travel by car works out that 30 students travel to school by car

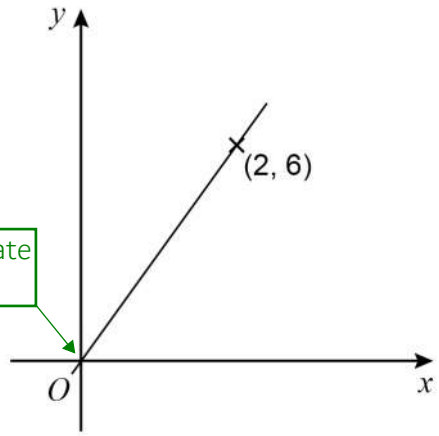
$\frac{30}{150} = \frac{10}{50} = \frac{20}{100}$

Expressing the 30 students who travel by car as a fraction of the 150 students. Simplifying the fraction by dividing both the numerator and denominator by 3 to get 10/50. Then multiplying both the numerator and denominator by 2 to get 20/100

Answer 20 %

Percentage is out of 100 so 20/100 is 20%

17 A straight line passes through O and (2, 6)



This point is (0, 0). The x-coordinate is 0 and the y-coordinate is 0

Circle the equation of the line.

[1 mark]

$y = x + 4$ $y = 6$ $y = 3x$ $y = \frac{1}{3}x$

y = x + 4 does not work as adding 4 to the x-coordinate of 0 does not give the y-coordinate of 0.

y = 6 does not work as the y-coordinate of (0, 0) is not 6.

y = 1/3 x does not work as the y-coordinate of 6 is not 1/3 of the x-coordinate of 2

6

Do not write outside the box

18 (a) Work out 110% of 80

[2 marks]

80÷10 ← 10% as a fraction is 10/100, which simplifies to 1/10. Dividing the 80 by 10 works out that 10% of 80 is 8

80+8 ← 100% of 80 is 80. Adding the value of 10% to 100% gives 110%

Answer 88

18 (b) Work out 21 as a fraction of 12

Circle your answer.

[1 mark]

$\frac{7}{4}$ $\frac{4}{7}$ $\frac{3}{4}$ $\frac{4}{3}$

21/12 can be simplified by dividing both the numerator and denominator by 3 to get 7/4

Do not write outside the box

19 Bags X and Y each contain counters.

Bag X	**Bag Y**
30 counters	5 counters
Each counter is green, white or yellow	3 green and 2 red

19 (a) P(green counter from X) = P(red counter from Y)

Work out the number of green counters in X.

[2 marks]

$\frac{2}{5} \times 30$ ← 2 out of the 5 counters in Y are red so the probability of picking a red counter from Y is 2/5. This is equal to the probability of picking a green in X. So 2/5 of the 30 counters in bag X must be green

Answer 12

↑ To multiply by a fraction, divide by the denominator then multiply the result by the numerator. 30 ÷ 5 = 6 then 6 x 2 = 12

19 (b) All 35 counters are put into one bag.

One counter is picked at random.

Work out the probability that the counter is **not** red.

[2 marks]

35 − 2 ← Subtracting the number of red counters from the total number of counters leaves the number of counters which are not red

Answer $\frac{33}{35}$

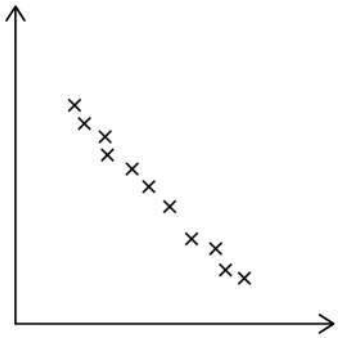
↑ 33 out of the 35 counters are not red

7

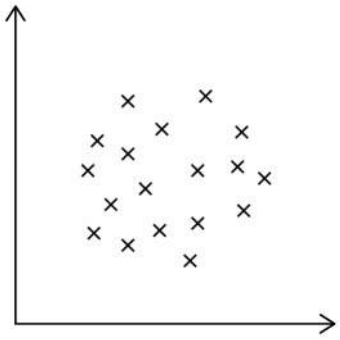
Do not write outside the box

20 A and B are scatter graphs.

Graph A



Graph B



What type of correlation is shown by each graph?

Choose from

Weak positive
Strong positive
Weak negative
Strong negative
No correlation

[2 marks]

Graph A Strong negative

Graph B No correlation

If drawing a line of best fit, A would have a negative gradient and all the points would be quite close to it for Graph A so it has strong negative correlation. Graph B has no correlation as a suitable line of best fit cannot be drawn

Do not write outside the box

21 (a) All the terms of a **geometric** progression are positive.

The second and fourth terms are shown.

..... 4 16

Work out the first and third terms.

[2 marks]

$4x^2 = 16$ ← Geometric means that each term is multiplied by the same amount to get the next term. Let x be the amount it multiplies by each time. 4 multiplied by x twice gives 16. Writing this as an equation

$x^2 = 4$ ← Dividing both sides by 4 to get x^2 on its own

$x = 2$ ← Square rooting both sides finds that x is 2. There is no need to do the negative square root as x must be positive if all the terms are positive. So each term is multiplied by 2 to get to the next term

First term 2

To go from the second term to the first term, the 4 must be divided by 2 as this is the opposite of multiplying by 2

Third term 8

To go from the second term to the third term, the 4 must be multiplied by 2

21 (b) The first two terms of an **arithmetic** progression are shown.

p $5p$ 9p ← The sequence is arithmetic so increases by the same amount between each term. It increases by 4p from p to 5p so must increase by 4p again to 9p for the third term

The sum of the first three terms is 90

Work out the value of p.

[3 marks]

$15p = 90$ ← The sum of p, 5p and 9p is 15p. This must be equal to the 90

15, 30, 45, 60, 75, 90 ← Dividing both sides by 15 gives p. Counting up in 15s until it reaches 90

Answer 6

6 lots of 15 go into 90

7

Do not write outside the box

22 This formula converts temperature in degrees Fahrenheit (F) to kelvin (K)

$$K = \frac{5}{9}(F - 32) + 273$$

A pottery oven is heated to 2192 degrees Fahrenheit.

Work out this temperature in kelvin.

[3 marks]

2192
- 32
2160

← Following the order of operations, BIDMAS, so brackets are calculated first. Substituting in 2192 for F gives 2192 - 32 = 2160

0240
9 | 2¹1³60

← Then multiplying the 2160 by 5/9. To multiply by a fraction, divide by the denominator then multiply by the numerator. First doing the 2160 divided by the 9

240
x 5
1200

← Then multiplying the result by the 5. So 5/9 x 2160 = 1200

+ ²273
1473

← Finally adding the 273 to the 1200

Answer 1473 kelvin

23 As a decimal $\frac{11}{40} = 0.275$

Work out $\frac{33}{400}$ as a decimal.

[2 marks]

0.275
x 3
0.825

← The 11 has been multiplied by 3 to get 33 so first multiplying the decimal by 3

Answer 0.0825

↑ Dividing the 0.825 by 10 as the 40 has been multiplied by 10 to get 400. Having a denominator 10 times the size is equivalent to dividing by 10

Do not write outside the box

24 The cost of a holiday is £2400

Rana pays a deposit followed by monthly payments, in the ratio

deposit : total of the monthly payments = 3 : 5

She makes 6 equal monthly payments.

Work out her monthly payment.

[4 marks]

3+5 ← Adding the 3 and 5 parts in the ratio works out that there are 8 parts in total in the ratio which represent the £2400

2400÷8 ← Dividing the £2400 by the 8 parts which represent it works out that 1 part of the ratio is worth £300

5×300 ← 5 parts represent the total of the monthly payments so multiplying the value of 1 part by 5 works out that the total of the monthly payments is £1500

$\begin{array}{r} 250 \\ 6\overline{)1\,5^{3}00} \end{array}$ ← Dividing the total of the monthly payments by the 6 months gives the monthly payment

Answer £ 250

25 Factorise fully $2x^2 + 6x$

[2 marks]

Answer 2x(x+3)

2 is the highest common factor of 2 and 6. x is the highest common factor of x^2 and x. So 2x is the highest common factor of both terms. Bringing 2x out as a factor and dividing both terms by it and leaving the result in a bracket. $2x^2 \div 2x = x$ and $6x \div 2x = 3$

11

Do not write outside the box

26 Two wire shapes make an earring.

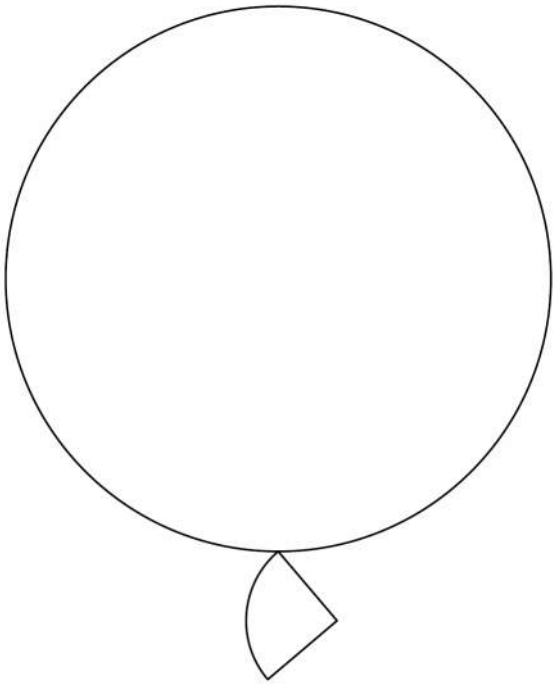
The shapes are

a circle with radius 21 mm

and

a quarter circle.

Not drawn accurately



radius of circle : radius of quarter circle = 7 : 2

26 (a) Show that the radius of the quarter circle is 6 mm

[1 mark]

21÷7 ← 7 parts of the ratio represent the radius of the circle which is 21 mm. So dividing the radius of the circle by 7 works out that 1 part of the ratio is worth 3 mm

3×2=6 ← Multiplying the value of 1 part of the ratio by 2 shows that the 2 parts which represents the radius of the quarter circle is 6 mm

Do not write outside the box

26 (b) Work out the **total** length of the wire in the earring.

Give your answer in the form $a\pi + b$ where a and b are integers.

[4 marks]

21
× 2
42

Circumference = π x diameter. Multiplying the radius of the circle by 2 works out that the diameter of the circle is 42 mm. Then multiplying this by π works out that the circumference of the circle is 42π mm

6×2

Circumference = π x diameter. Multiplying the radius of the quarter circle by 2 works out that the diameter of the quarter circle is 12 mm. Then multiplying this by π works out that the circumference of the quarter circle, if it was a whole circle, is 12π mm

12π ÷ 4

Dividing this 12π mm by 4 as it is a quarter circle works out that the arc length of the quarter circle is 3π mm

42π + 3π = 45π

Adding the circumference of the circle and the arc length of the quarter circle works out that the wire used in the circle and the wire used for the curve of the quarter circle is 45π mm

6 + 6

Adding 2 lots of the radius works out that the straight pieces of wire are 12 mm

Answer 45π + 12 mm

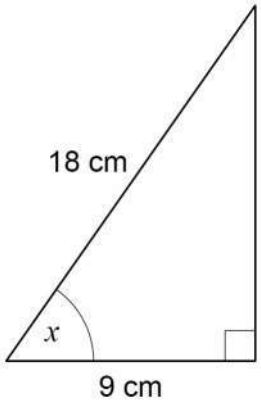
Adding the length of the curved lengths of the wire and the straight lengths of the wire. Leaving the 12 separate to the 45π as this is the form it asked for

Turn over for the next question

5

Do not write outside the box

27 Use trigonometry to work out the size of angle x.



Not drawn accurately

[2 marks]

SOH CAH TOA

Using right-angled trigonometry. Ticking A as the 9 cm is the adjacent and ticking H as the 18 cm is the hypotenuse. There are two ticks on the CAH formula triangle so this one can be used

$\frac{9}{18} = \frac{1}{2}$

Covering C in the CAH formula triangle finds that cos of the angle = adjacent/hypotenuse. Putting the 9 over the 18 and simplifying by dividing both the numerator and denominator by 9 to get 1/2

0	30	45	60	90
4	3	2	1	0

Listing the angles of 0, 30, 45, 60, 90 degrees. Listing 4, 3, 2, 1, 0 under these for the cos values. Square rooting the 1 then putting the result over 2 gives 1/2 so cos60 = 1/2

Answer 60 degrees

Do not write outside the box

28 Rearrange $c = \frac{d+2}{3}$ to make d the subject.

[2 marks]

$d+2=3c$ ← Multiplying both sides by 3 to eliminate the denominator

Answer $d=3c-2$

↑ Subtracting 2 from both sides to get d on its own

29 (a) Write 360 000 in standard form.

[1 mark]

Answer 3.6×10^5

↑ It is divided by 10 5 times to get 3.6, a number at least 1 and less than 10. So 3.6 must be multiplied by 10^5 to keep it equal

29 (b) Write 9.2×10^{-3} as an ordinary number.

[1 mark]

Answer 0.0092

↑ x 10^{-3} means to divide by 10 3 times

END OF QUESTIONS

6