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

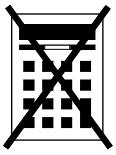
Foundation Tier Paper 1 Non-Calculator

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 order to answer the questions and get the marks. The worked solutions have been designed to show the smallest amount of work which needs to be done to answer the question.

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

Anything written in orange in a rectangle doesn't have to be written in the exam and is there to show what should be put into a calculator or measured using a ruler or protractor.

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

.CG Maths.

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 500 000 50 50 000

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?

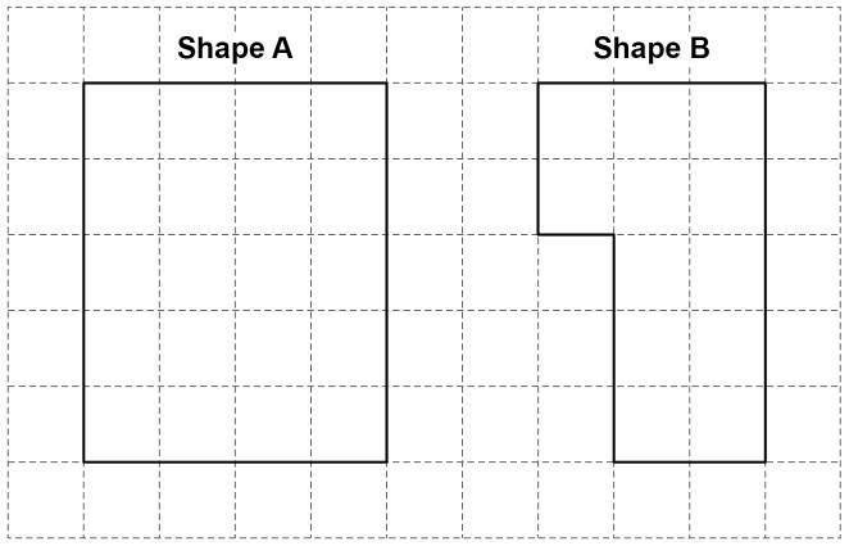
Circle your answer.

[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.

$2 \times 60 + \frac{60}{2} = 120 + 30 = 150$

There are 60 seconds in a minute. 2 x 60 works out 2 minutes in seconds and 60/2 works out 1/2 minute in seconds. Adding these together gives Samir's time in seconds. 130 is 20 less than 150

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
-24
7

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

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]

$43 \times 8 = 344$

$234 \div 6 = 39$

$344 - 39 = 305$

Answer 305

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

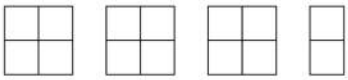
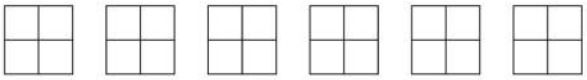
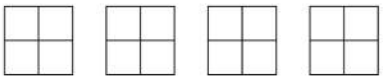
Turn over for the next question

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]

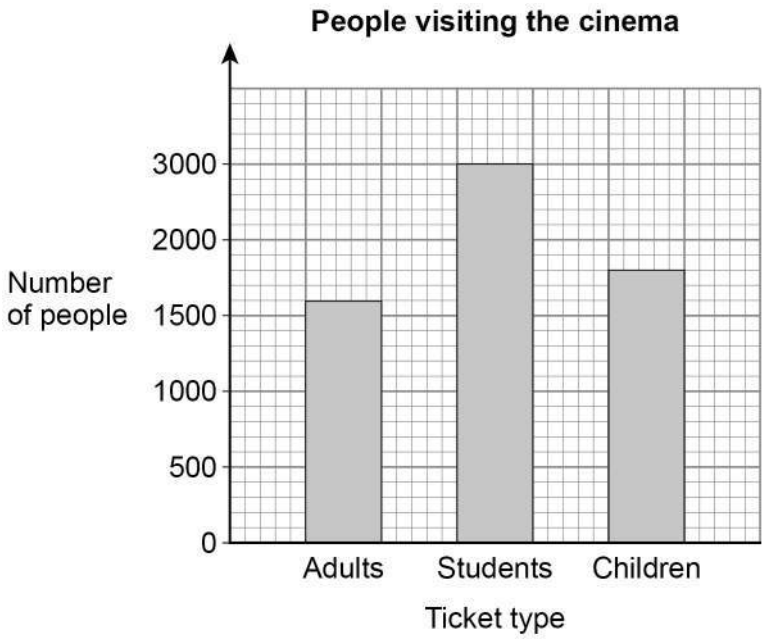
$40 \times 2 + \frac{40}{2}$ ← There are $2^1/_2$ more symbols for the students than adults

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

4

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]

1200 × 4

There are 12 months in a year so after the 8 months there are another 4 months. In each of these he earned £1200

7600

+ 4800

12400

Adding what he earned in the first 8 months and what he earned in the next 4 months to get what he earned 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

0.2 = 2/10. 50/10 = 5. 5 x 2 = 10

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

Give your answer as a decimal.

[2 marks]

Answer 0.73

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

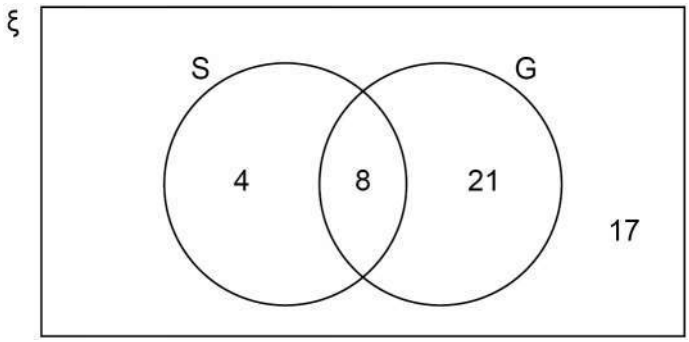
Turn over for the next question

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.

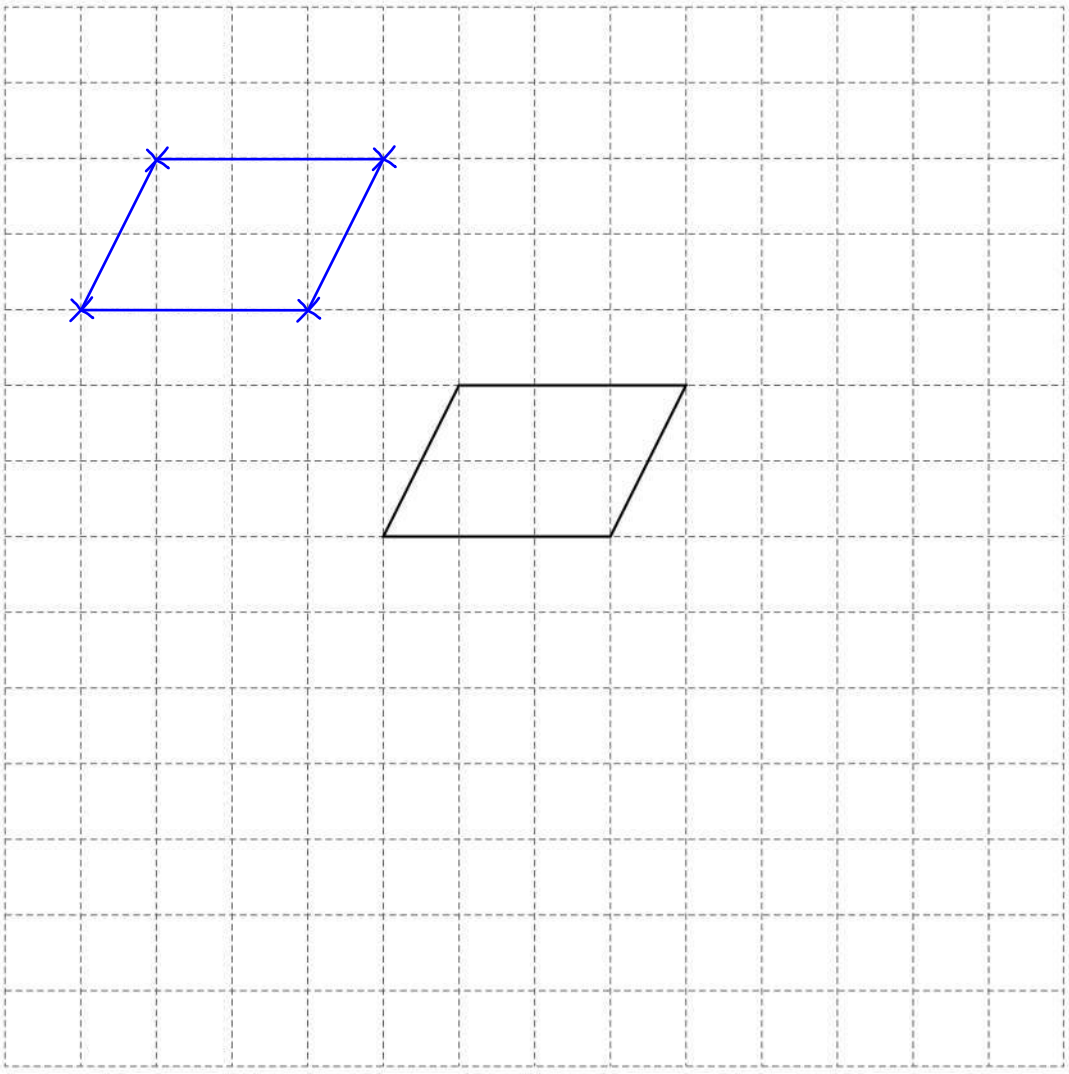
[1 mark]

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

Dividing both sides by 6 makes x the subject

$x =$ 4

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

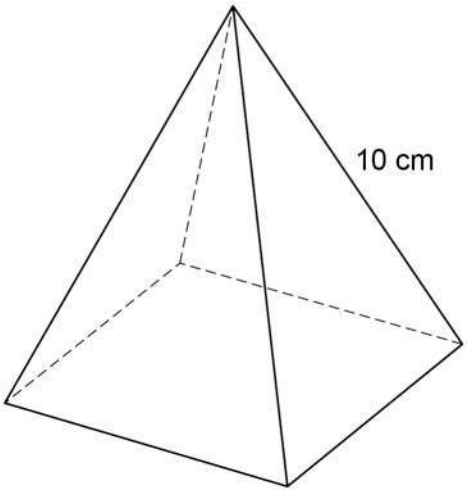
Collecting like terms

Answer $13a + 2$

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]

68 − 40 ← There are 4 sloping edges each with a length of 10cm. 4 x 10 = 40. Subtracting this 40 from 68 works out the sum of the edges on the square

28 ÷ 4 ← There are 4 equal edges on the square so dividing their total length of 28 by 4 works out the length of one of the edges on the square

7^2 ← The side length of the square is 7cm. Area of square = length^2

Answer 49 cm^2

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]

41 out of the 78 boys travel to school by bus

Answer $\frac{41}{78}$

Do not write outside the box

18 (a) Work out 110% of 80

[2 marks]

$\frac{80}{10} = 8$ ← 10% is equivalent to 1/10 as a fraction. This works out 1/10 of 80

$80 + 8$ ← 100% is the full amount so is 80. Adding the 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

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 is 2/5. This is equal to the probability of getting a green in X. So 2/5 of the 30 counters must be green

Answer 12

To multiply by a fraction, divide by the denominator then multiply by the numerator. 30/5 = 6. 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 $\frac{33}{35}$

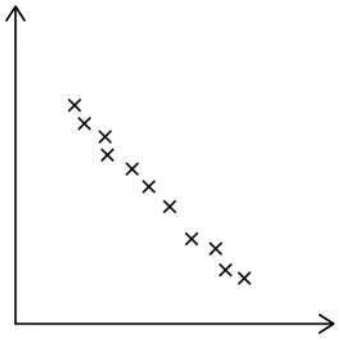
33 out of the 35 counters are not red

7

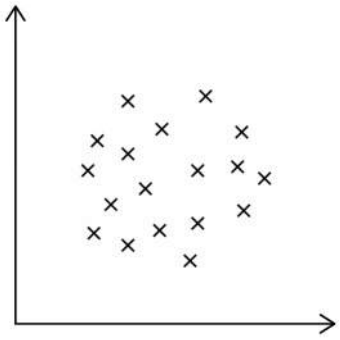
Do not write outside the box

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, it 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; there is no link between the two variables

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]

$4x^2 = 16$

$x^2 = 4$

$x = 2$

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 then rearranging to find x. It must be 2 as it cannot be negative

First term 2

Third term 8

The sequence multiplies by 2 each term when going forward. So going backward it must divide by 2. 16/2 = 8. 4/2 = 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 90

15, 30, 45, 60, 75, 90

Dividing both sides by 15 gives p. Short division will not help much dividing 90 by 15 so counting up in 15s until it reaches 90

Answer 6

6 15s 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

0240
9|2¹3¹60

Following the order of operations, BIDMAS, so brackets are calculated first. Substituting in 2192 for F gives 2192 - 32. Then multiplying the result by 5/9. To multiply by a fraction, divide by the denominator then multiply by the numerator. Finally adding 273 to the result

240
× 5
1200
+ 273

Answer 1473 kelvin

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

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

[2 marks]

0.275
× 3
0.825

33 is 3 x 11 so first multiplying the decimal by 3

Dividing the result by 10 as 400 is 40 x 10. Having a denominator 10 times the size is equivalent to dividing by 10

Answer 0.0825

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]

$\frac{2400}{8}$ ← There is £2400 in total and 8 parts in the ratio in total. So 8 parts represent the £2400. Dividing 2400 by 8 works out what 1 part is worth

5 × 300 ← 5 parts represent the total of the monthly payments so multiplying 1 part by 5 works out the total of the monthly payments

Answer £ 250

$6\overline{)1\,5^{3}0\,0}$

Dividing the total of the monthly payments by the 6 months gives the monthly payment

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

[2 marks]

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 this out as a factor and leaving the rest in a bracket. $2x^2/2x = x$. $6x/2x = 3$

Answer $2x(x+3)$

11

Do not write outside the box

26 Two wire shapes make an earring.

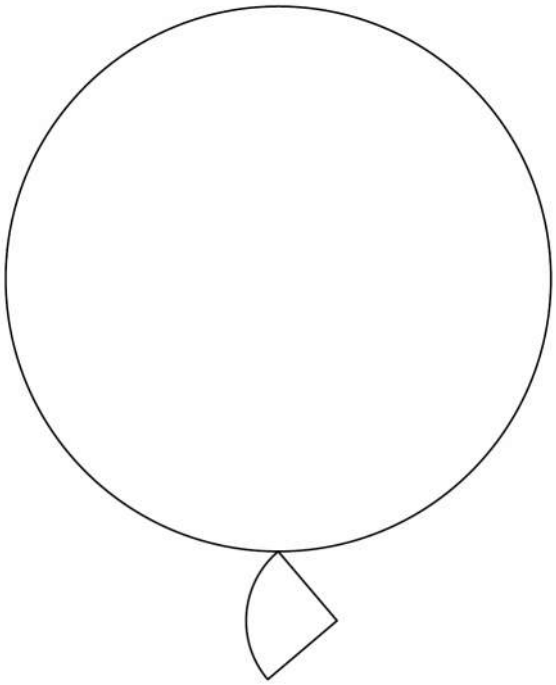
The shapes are

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]

$\frac{21}{7} \times 2 = 6$

7 parts of the ratio represent the radius of the circle which is 21mm. So dividing by 7 works out 1 part of the ratio. 21/7 = 3. Then multiplying this by 2 works out the 2 parts which represents the radius of the quarter circle. 3 x 2 = 6

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]

$\pi \times 2 \times 21 + \frac{1}{4} \times \pi \times 2 \times 6 + 2 \times 6$

Adding the wire used for the circle and quarter circle give the total length of wire

The length of wire used in the circle.
Circumference = π x diameter
Diameter = 2 x radius

The length of wire used in the quarter circle.
Arc length = 1/4 of the circumference
Circumference = π x diameter
Diameter = 2 x radius
Then adding 2 lots of the radius

Answer $45\pi + 12$ mm

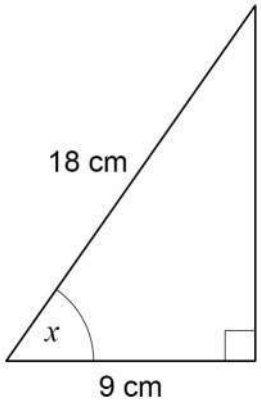
π x 2 x 21 = 42π. 1/4 x π x 2 x 6 = 3π. 2 x 6 = 12.
Then adding all these together

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

Listing SOH CAH TOA as formula triangles. Ticking A and H as we have the adjacent and hypotenuse

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

Two ticks on the CAH formula triangle means that this one can be used. By covering C in the formula triangle as this is the term involving the angle: cos(x) = adjacent/hypotenuse = 9/18. This simplifies to 1/2

Answer 60 degrees

0 30 45 60 90

$\frac{\sqrt{4}}{2}$ $\frac{\sqrt{3}}{2}$ $\frac{\sqrt{2}}{2}$ $\frac{\sqrt{1}}{2}$ $\frac{\sqrt{0}}{2}$

The angles we need to remember for the trig values are 0, 30, 45, 60 and 90. Listing these out in order. For the cos values list 4, 3, 2, 1, 0 under these, square root them all then put them over 2. $\sqrt{1}/2$ simplifies to 1/2 so cos(60) = 1/2. The angle must be 60

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 fraction

Subtracting 2 from both sides to get d on its own

Answer $d=3c-2$

29 (a) Write 360 000 in standard form.

[1 mark]

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

Answer 3.6×10^5

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

[1 mark]

Divide by 10 3 times

Answer 0.0092

END OF QUESTIONS

6