

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname *StemUp Model Solution*

Forename(s)

Candidate signature

GCSE MATHEMATICS

F

Foundation Tier Paper 3 Calculator

Tuesday 13 June 2017

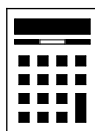
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- 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.
- 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.

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	

Advice

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



J U N 1 7 8 3 0 0 3 F 0 1

Answer **all** questions in the spaces provided

- 1 Circle the lowest of these temperatures.

[1 mark]

 -4.9°C 0°C -7°C 0.1°C

- 2 Circle the expression that is four times bigger than n .

[1 mark]

 $n + 4$ $4n$ $\frac{n}{4}$ n^4

- 3 Circle the fraction **greater** than $\frac{3}{10}$

[1 mark]

 $\frac{1}{3}$ $\frac{3}{11}$ $\frac{4}{15}$ $\frac{29}{100}$ 

4 Circle the value of 2^5

[1 mark]

10

25

32

64

5 (a) Simplify $a \times a \times a + b + b$

[2 marks]

$$a \times a \times a = a^3$$

$$b + b = 2b$$

Answer $a^3 + 2b$

5 (b) Simplify $5(x + 3) - x + 2$

[3 marks]

$$5(x + 3) - x + 2 = 5x + 15 - x + 2$$

$$= 4x + 17$$

Answer $4x + 17$

Turn over for the next question

Turn over ►



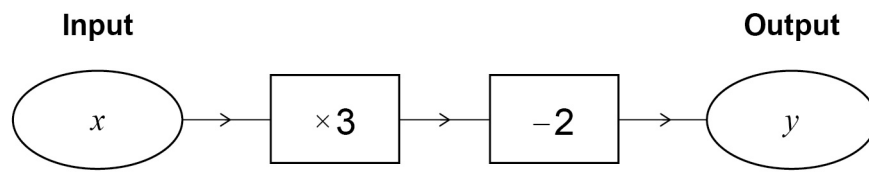
- 6** Twelve cards numbered 1 to 12 are put into six pairs.
Each pair has a total.
- Complete the table to show the pairs and their totals.

[4 marks]

Cards	Total
1 and 2	3
<u> 3 </u> and <u> 6 </u>	9
<u> 4 </u> and <u> 7 </u>	11
<u> 5 </u> and <u> 9 </u>	14
<u> 8 </u> and <u> 11 </u>	19
<u> 10 </u> and <u> 12 </u>	22



7 Here is a number machine.



7 (a) Work out the output when the input is 4

[1 mark]

$$4 \times 3 = 12$$

$$12 - 2 = 10$$

Answer 10

7 (b) Work out the output when the input is -4

[1 mark]

$$-4 \times 3 = -12$$

$$-12 - 2 = -14$$

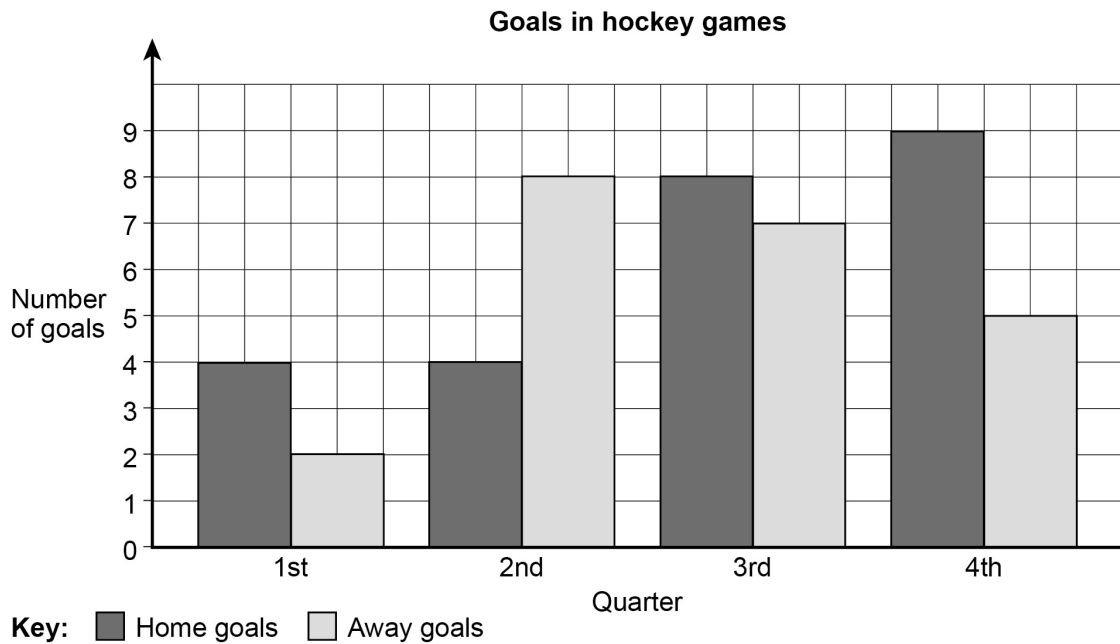
Answer -14

Turn over for the next question



8

Here is information about the goals scored in some hockey games.
Each game has four quarters.



- 8 (a)** Which quarter was the mode for **away** goals?
Circle your answer.

[1 mark]

1st

2nd

3rd

4th

- 8 (b)** There were 10 games.

Work out the mean number of goals per game.

[2 marks]

$$\text{Home: } 4 + 4 + 8 + 9 = 25$$

$$\text{Away: } 2 + 8 + 7 + 5 = 22$$

$$\text{Mean} = (25 + 22) \div 10 = 47 \div 10 = 4.7$$

Answer 4.7



- 8 (c) In total, how many **more** home goals were scored than away goals?

[2 marks]

$$\text{Home goals} = 4 + 4 + 8 + 9 = 25$$

$$\text{Away goals} = 2 + 8 + 7 + 5 = 22$$

$$25 - 22 = 3$$

Answer 3

- 8 (d) Rob says,

“More home teams **must** have won because there were more home goals.”

Is he correct?

Give a reason for your answer.

[1 mark]

No. The home teams could have scored lots of goals in

just one or two games and lost the other games, so the

away teams could still have won more games.



9 (a) List **all** the factors of 30

[2 marks]

1 × 30, 2 × 15, 3 × 10, 5 × 6

Answer *1, 2, 3, 5, 6, 10, 15, 30*

9 (b) A factor of 30 is chosen at random.

What is the probability that it is a 2-digit number?

[1 mark]

2-digit factors: 10, 15, 30

3 of the 8 factors have 2 digits

Answer *$\frac{3}{8}$*



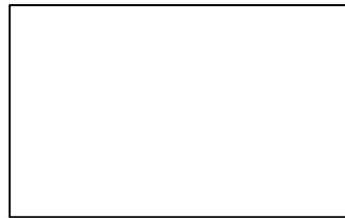
10

Each shape below has an area of 24 cm^2

Complete the missing lengths.

[3 marks]

Rectangle



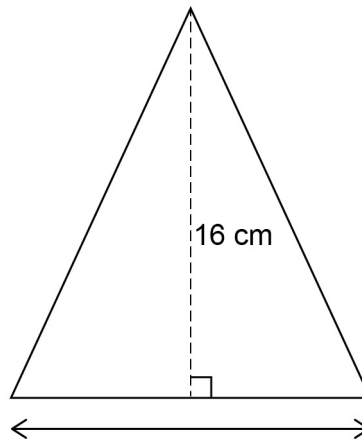
6 cm

4 cm

$$24 \div 6 = 4$$

Not drawn
accurately

Triangle



16 cm

$$\frac{1}{2} \times b \times 16 = 24$$

$$8b = 24$$

$$b = 24 \div 8 = 3$$

3 cm

Turn over for the next question

Turn over ►



- 11 A television channel shows 12 minutes of adverts in each half hour.

How many **minutes** of adverts does it show from 5 am to 11 pm?

[3 marks]

$$5 \text{ am to } 11 \text{ pm} = 18 \text{ hours}$$

$$12 \text{ minutes each half hour} = 24 \text{ minutes each hour}$$

$$18 \times 24 = 432$$

Answer 432 minutes

- 12 Put these probabilities in order, starting with the least likely.

$$44\% \quad \frac{1}{4} \quad 0.404 \quad \frac{4}{10}$$

[2 marks]

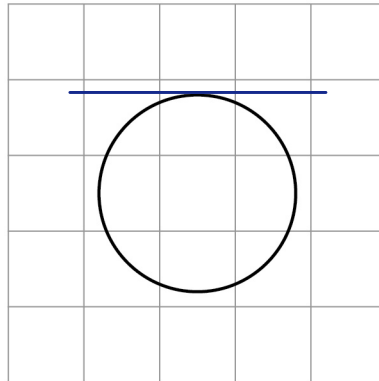
$$44\% = 0.44 \quad 1/4 = 0.25 \quad 0.404 \quad 4/10 = 0.4$$

$$0.25 < 0.4 < 0.404 < 0.44$$

Answer $\frac{1}{4}$, $\frac{4}{10}$, 0.404 , 44%



- 13** A circle is drawn on a centimetre grid.



- 13 (a)** Draw a tangent to the circle.

[1 mark]

- 13 (b)** Grace works out that the area of the circle is more than 9 cm^2

Why must this be wrong?

[1 mark]

The circle fits inside a 3 cm by 3 cm square of the grid,

which has an area of $3 \times 3 = 9 \text{ cm}^2$.

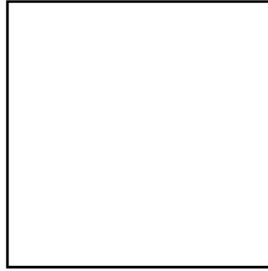
The circle does not fill the whole square,

so the area of the circle must be less than 9 cm^2 .

Turn over for the next question



- 14 (a)** The front elevation, side elevation and plan of a solid are all the same, as shown.

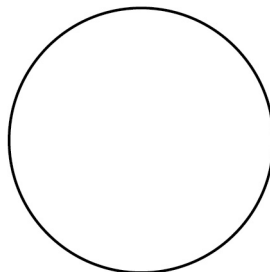


Write down the name of the solid.

[1 mark]

Answer cube

- 14 (b)** The front elevation, side elevation and plan of a solid are all the same, as shown.



Write down the name of the solid.

[1 mark]

Answer sphere



15

Show that there are **exactly** five 3-digit cube numbers.**[3 marks]**

$$4^3 = 64 \quad (\text{only 2 digits})$$

$$5^3 = 125$$

$$6^3 = 216$$

$$7^3 = 343$$

$$8^3 = 512$$

$$9^3 = 729$$

$$10^3 = 1000 \quad (\text{4 digits})$$

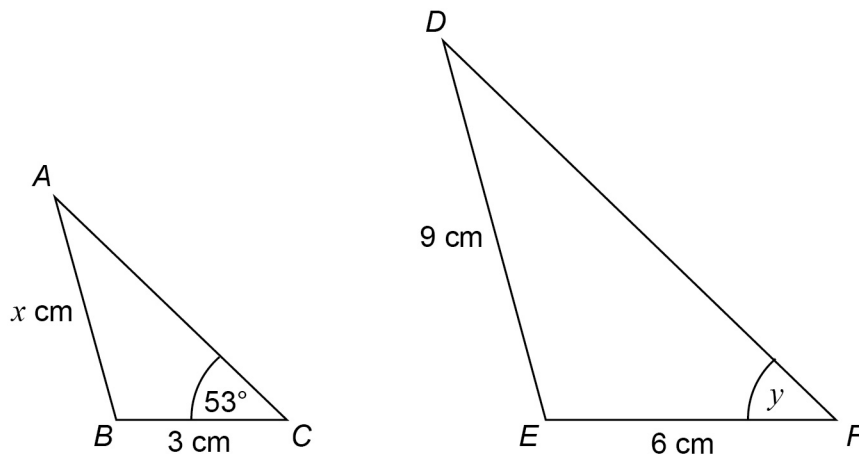
So the 3-digit cube numbers are 125, 216, 343, 512 and 729

which is exactly five cube numbers.

Turn over for the next question**Turn over ►**

- 16** Triangles ABC and DEF are similar.

Not drawn
accurately



- 16 (a)** Work out the value of x .

[2 marks]

$$\text{Scale factor} = 6 \div 3 = 2$$

$$x = 9 \div 2 = 4.5$$

Answer 4.5

- 16 (b)** Write down the size of angle y .

[1 mark]

Answer 53 degrees

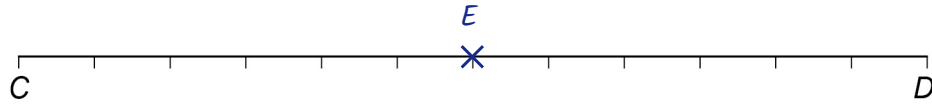


17 CD and PQ are lines of length 12 cm

17 (a) $CE : CD = 1 : 2$

Mark point E on the line with a cross.

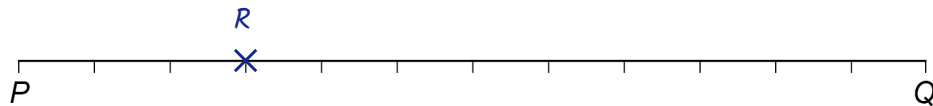
[1 mark]



17 (b) $PR : RQ = 1 : 3$

Mark point R on the line with a cross.

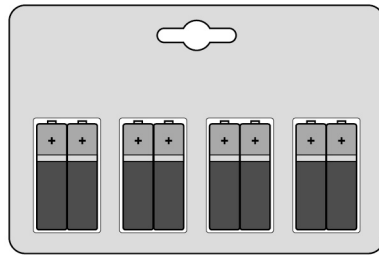
[1 mark]



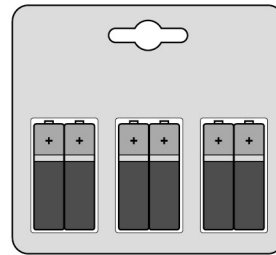
Turn over for the next question



- 18 A shop sells two brands of battery.



Brand A
Pack of 8
Price £3.60



Brand B
Pack of 6
Price £2.94

One brand A battery powers a toy for 5 hours.

One brand B battery powers the same toy for $5\frac{1}{2}$ hours.

Which brand is better value?

You **must** show your working.

[5 marks]

$$\text{Brand A: } £3.60 \div 8 = £0.45 \text{ per battery}$$

$$£0.45 \div 5 = £0.09 \text{ per hour}$$

$$\text{Brand B: } £2.94 \div 6 = £0.49 \text{ per battery}$$

$$£0.49 \div 5.5 = £0.0890909... \text{ per hour}$$

$$£0.0890909... < £0.09$$

Brand B costs less per hour of power,

so Brand B is better value.

Answer Brand B



- 19** The value of x can be 2 or 5
The value of y can be 3 or 12

- 19 (a)** List the possible values of xy

[2 marks]

$$2 \times 3 = 6, \quad 2 \times 12 = 24, \quad 5 \times 3 = 15, \quad 5 \times 12 = 60$$

Answer 6, 24, 15, 60

- 19 (b)** Work out the **least** possible value of $\frac{x-y}{x}$

You **must** show your working.

[2 marks]

$$\frac{2-3}{2} = -0.5$$

$$\frac{2-12}{2} = -5$$

$$\frac{5-3}{5} = 0.4$$

$$\frac{5-12}{5} = -1.4$$

Least value is -5

Answer -5

Turn over for the next question



20

An exam has two papers.

Anil scores

33 out of 60 on paper 1

and

75 out of 100 on paper 2

Work out his percentage score for the exam.

[3 marks]

$$\text{Total marks scored} = 33 + 75 = 108$$

$$\text{Total marks available} = 60 + 100 = 160$$

$$108 \div 160 = 0.675$$

$$0.675 \times 100 = 67.5\%$$

Answer 67.5 %



21

Purple paint is made by mixing red paint and blue paint in the ratio 5 : 2

Yan has 30 litres of red paint and 9 litres of blue paint.

What is the **maximum** amount of purple paint he can make?

[3 marks]

Using all the red: $30 \div 5 = 6$, blue needed = $2 \times 6 = 12$ litres

He only has 9 litres of blue, so the blue runs out first.

$9 \div 2 = 4.5$ litres per part

Red used = $5 \times 4.5 = 22.5$ litres

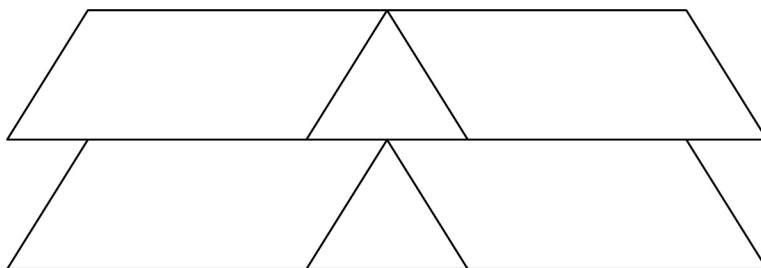
Purple = $22.5 + 9 = 31.5$ litres

Answer 31.5 litres

Turn over for the next question

Turn over ►

- 22** This shape is made from two triangles and four congruent parallelograms.



Not drawn
accurately

For each statement, tick the correct box.

- 22 (a)** The triangles are equilateral.

[1 mark]

☐

Must be true

☒

Could be true

☐

Must be false

- 22 (b)** The triangles are congruent.

[1 mark]

☒

Must be true

☐

Could be true

☐

Must be false



23 (a) The length of a pipe is 6 metres to the nearest metre.

Complete the error interval for the length of the pipe.

[2 marks]

Answer 5.5 m $\leq$ length < 6.5 m

23 (b) The length of a different pipe is 4 metres to the nearest metre.

Olly says,

“The total length of the two pipes is 11 metres to the nearest metre.”

Give an example to show that he could be correct.

[2 marks]

e.g. $6.4 \text{ m} + 4.4 \text{ m} = 10.8 \text{ m}$

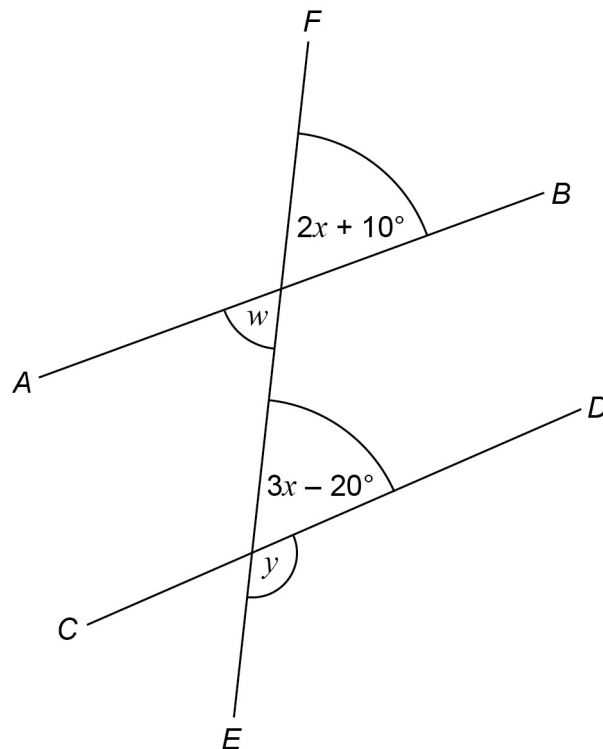
$10.8 \text{ m} = 11 \text{ m}$ to the nearest metre, so he could be correct.

Turn over for the next question

Turn over ►



- 24 AB , CD and EF are straight lines.



Not drawn
accurately

- 24 (a) Ava assumes that AB and CD are parallel.

What answer should she get for the size of angle y ?

[4 marks]

Corresponding angles are equal: $2x + 10 = 3x - 20$

$10 + 20 = 3x - 2x$, so $x = 30$

$3x - 20 = 3 \times 30 - 20 = 70^\circ$

(check: $2x + 10 = 2 \times 30 + 10 = 70^\circ$)

Angles on a straight line add up to 180°

$y = 180 - 70 = 110^\circ$

Answer 110 degrees



24 (b)

In fact,

 AB and CD are **not** parallelangle w is 60° What effect does this have on the size of angle y ?

Tick a box.

☒
 y is bigger
☐
 y is the same
☐
 y is smaller

Show working to support your answer.

[3 marks]

Vertically opposite angles are equal: $2x + 10 = 60$

$2x = 50$, so $x = 25$

$3x - 20 = 3 \times 25 - 20 = 55^\circ$

$y = 180 - 55 = 125^\circ$

125° is bigger than 110°

so y is bigger (by 15°).

Turn over for the next question**Turn over ►**

25 There are 720 boys and 700 girls in a school.

The probability that a boy chosen at random studies French is $\frac{2}{3}$

The probability that a girl chosen at random studies French is $\frac{3}{5}$

25 (a) Work out the number of students in the school who study French.

[3 marks]

$$\text{Boys: } 720 \div 3 \times 2 = 480$$

$$\text{Girls: } 700 \div 5 \times 3 = 420$$

$$480 + 420 = 900$$

Answer 900

25 (b) Work out the probability that a student chosen at random from the whole school does **not** study French.

[2 marks]

$$\text{Total students} = 720 + 700 = 1420$$

$$\text{Not French} = 1420 - 900 = 520$$

$$P(\text{not French}) = \frac{520}{1420} = \frac{26}{71}$$

Answer $\frac{26}{71}$



26

Circle the expression equivalent to $x^2 - 4x - 12$

[1 mark]

$(x - 4)(x - 8)$

$(x + 3)(x - 4)$

$(x - 12)(x + 1)$

$(x + 2)(x - 6)$

27

How are the whole number solutions to A and B different?

A Solve $3 \leq 3x < 18$

B Solve $3 < 3x \leq 18$

[2 marks]

$$A: 3 \leq 3x < 18 \rightarrow 1 \leq x < 6, \text{ whole numbers } 1, 2, 3, 4, 5$$

$$B: 3 < 3x \leq 18 \rightarrow 1 < x \leq 6, \text{ whole numbers } 2, 3, 4, 5, 6$$

$$A \text{ includes } 1 \text{ but } B \text{ does not include } 1.$$
$$B \text{ includes } 6 \text{ but } A \text{ does not include } 6.$$

END OF QUESTIONS



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