Q1.

Fill in the three missing whole numbers in this calculation.

Each number is less than 10

$$\boxed{} \times \boxed{} \times \boxed{} = 105$$

1 mark

Q2.

Emma thinks of two **prime** numbers.

She adds the two numbers together.

Her answer is 36

Write **all** the possible pairs of prime numbers Emma could be thinking of.

_____

2 marks

Q3.

36 and 64 are both square numbers

They have a sum of 100

Find two **square** numbers that have a sum of **130**

$$\boxed{} \quad \text{and} \quad \boxed{}$$

1 mark

Q4.

364 is a multiple of 7 but not a multiple of 3

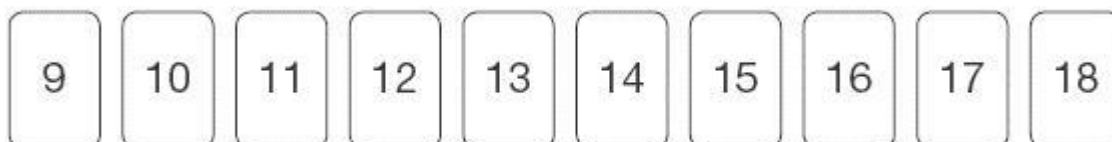384 is a multiple of 3 but not a multiple of 7

Find a number between 364 and 384 that is **both** a multiple of 7 **and** a multiple of 3

Show your method

2 marks

Q5.

Here are some number cards.

| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

Joe picks two **even** numbers.
Dev picks two **odd** numbers.

Joe gives one of his cards to Dev.
Dev gives one of his cards to Joe.

Joe says,

> *'Now my cards are both square numbers'.*

Dev says,

> *'Now my cards are both multiples of 5'.*

What numbers did they each start with?

Joe started with ☐ and ☐

Dev started with ☐ and ☐

2 marks

Q6.

Three whole numbers add up to 50

Seb says,

'All three numbers must be even numbers.'

Is Seb correct?
Circle **Yes** or **No**.

Yes / No

Explain how you know.

1 mark

Q7.

Write **all** the numbers between 50 and 100 that are **factors of 180**

2 marks

Q8.

Work out the missing numbers below.

The first one is done for you.

The first $\boxed{5}$ multiples of $\boxed{4}$ **add to 60**

(because 4 + 8 + 12 + 16 + 20 = 60)

The first $\boxed{3}$ multiples of $\boxed{}$ **add to 60**

1 mark

Now use **different** numbers to complete the sentence below.

The first $\boxed{}$ multiples of $\boxed{}$ **add to 60**

1 mark

Q9.

Here is a number chart.

Every third number in the chart has a circle on it.

The chart continues in the same way.

Here is another row in the chart.

Draw the missing circles.

1 mark

Will the number **1003** have a circle on it?
 Circle **Yes** or **No**.

Yes / No

Explain how you know.
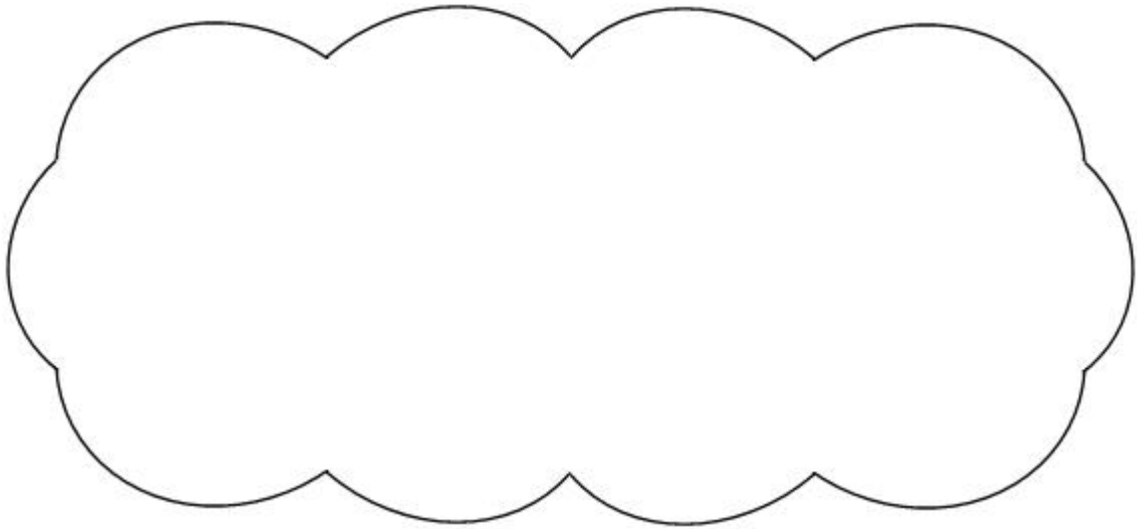
1 mark

Q10.

Circle the **two** prime numbers.

29   39   49   59   69

1 mark

Q11.

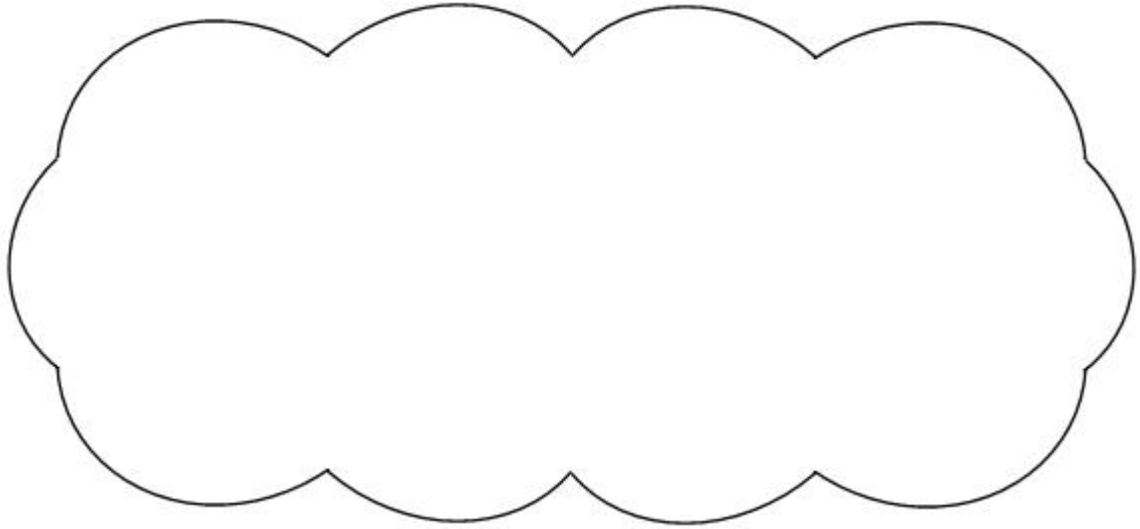Find two **square numbers** that total 45

[ ] + [ ] = 45

1 mark

Q12.

Julie says,

*'I added three odd numbers
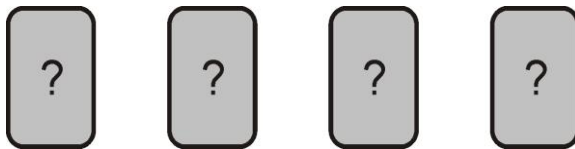and my answer was 50'*

Explain why Julie cannot be correct.

Q13.

Debbie has a pack of cards numbered from 1 to 20

She picks four different number cards.

Exactly three of the four numbers are multiples of 5

Exactly three of the four numbers are even numbers.

All four of the numbers add up to less than 40

Write what the numbers could be.

Q14.

Write in the **two** missing digits.

$$\boxed{}\,\boxed{0} \times \boxed{}\,\boxed{0} = \boxed{3}\,\boxed{0}\,\boxed{0}\,\boxed{0}$$

Q15.

Circle the number **closest** in value to **0.1**

0.01   **0.05**   **0.11**   **0.2**   **0.9**

Q16.

Write the **three prime numbers** which multiply to make **231**

☐ × ☐ × ☐ = 231

Q17.

The rule for this sequence of numbers is **'add 3 each time'**.

1   4   7   10   13   16   ...

The sequence continues in the same way.

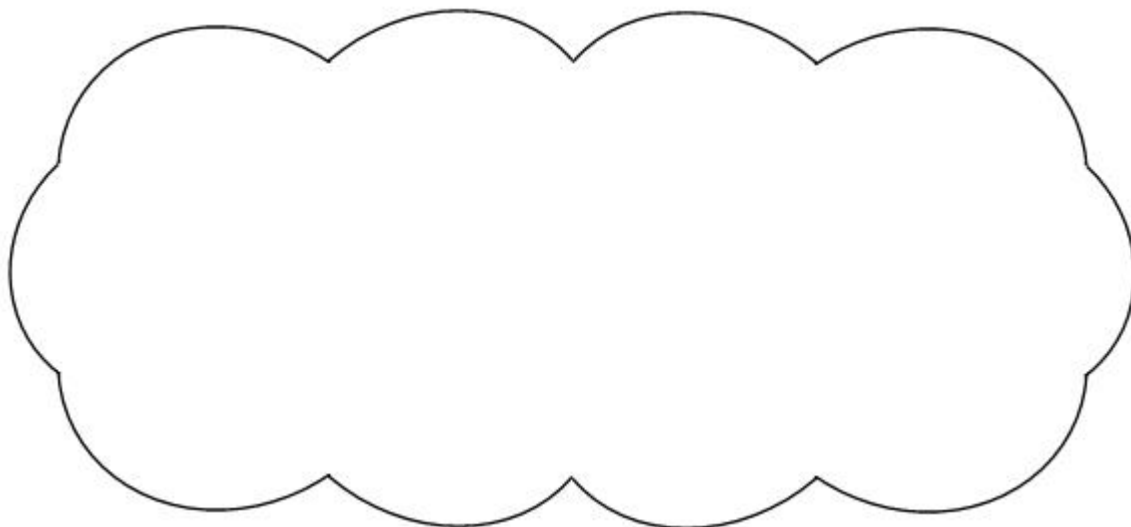Mary says,

'No matter how far you go there will never be a multiple of 3 in the sequence'.

Is she correct?
Circle Yes or No.   **Yes / No**

Explain how you know.

Q18.

This three-digit number has **2** and **7** as **factors**.

2 9 4

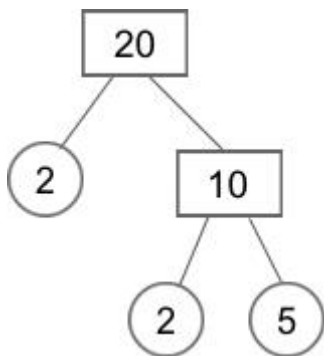Write another **three-digit** number which has **2** and **7** as **factors**.

1 mark

Q19.

Any number can be written as a product of its prime factors,
for example:

$$20 = 2 \times 2 \times 5$$

Write 90 as a product of its prime factors.

90 = _____

1 mark

Q20.

Put these values in order with the smallest first

5^2 3^2 3^3 2^3

smallest   largest

1 mark

Q21.

Write a cross on the numbers that are <u>not</u> square numbers.

1^2 2^3 3^3 4^3 5^3

<div align="right">1 mark</div>
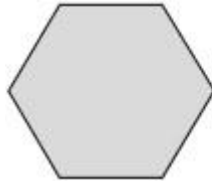
Q22.

These two shapes have the **same** perimeter.

regular hexagon   square

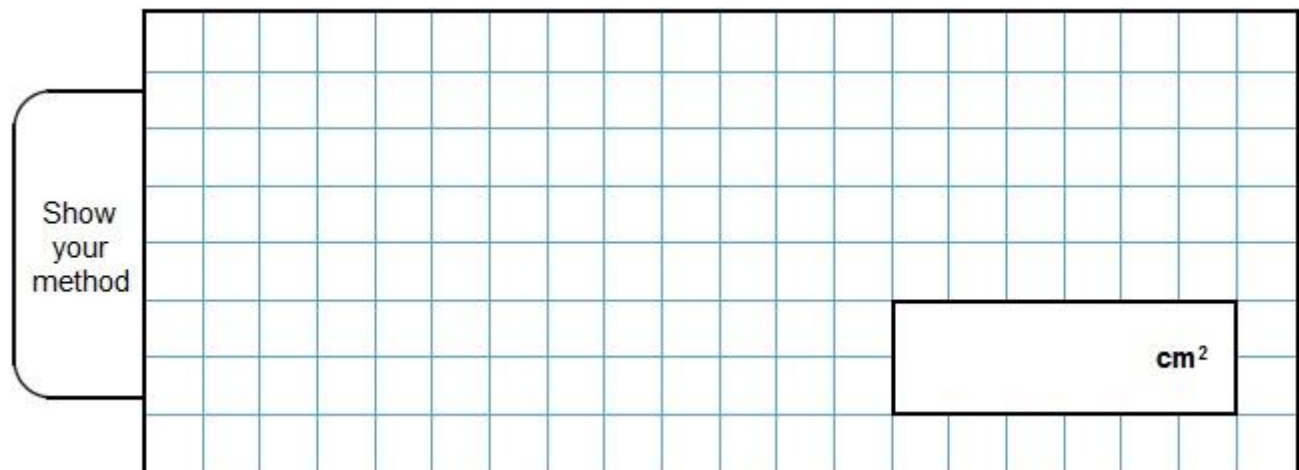**Not actual size**

The length of each side of the **hexagon** is **8** centimetres.

Calculate the **area** of the **square**.

Show your method

cm^2

<div align="right">2 marks</div>

Q23.

A machine pours 250 millilitres of juice every 4 seconds.

How many **litres** of juice does the machine pour every **minute**?

litres

2 marks

Q24.

Amina made this cuboid using centimetre cubes.

Not actual size

4 cm

3 cm

6 cm
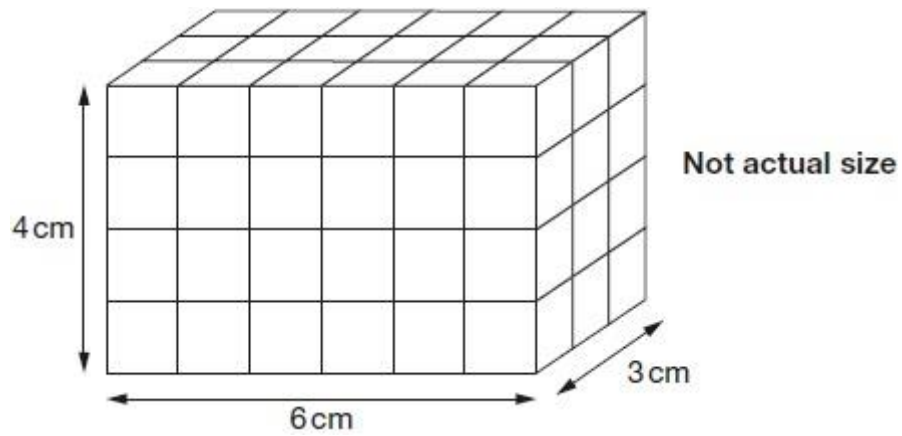
Stefan makes a cuboid that is 5 cm longer, 5 cm taller and 5 cm wider than Amina's cuboid.

What is the **difference** between the number of cubes in Amina's and Stefan's cuboids?

cubes

2 marks

Q25.

The International Space Station orbits the Earth at a height of 250 miles.
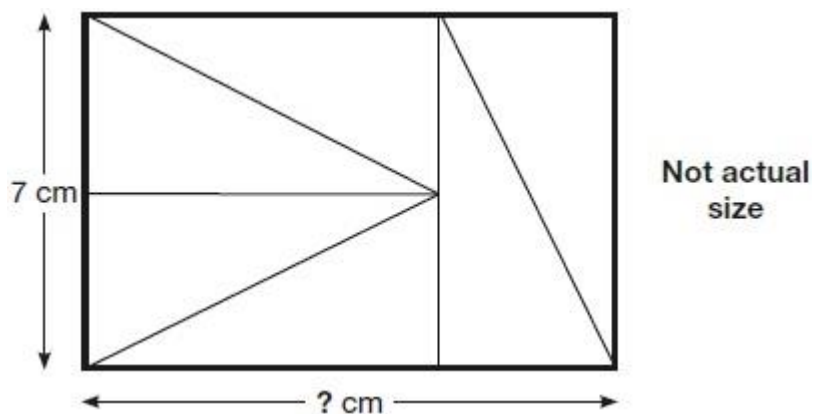
What is the height of the International Space Station in **kilometres?**

Use 8 kilometres equals 5 miles.

km

1 mark
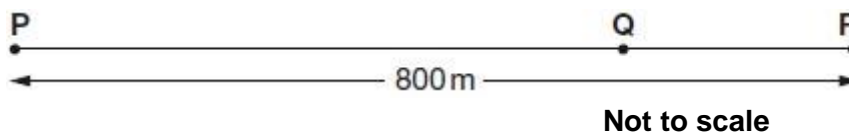
Q26.

Six identical right-angled triangles are arranged to make a rectangle.

7 cm

Not actual size

? cm

Calculate the **length** of the rectangle.

cm

1 mark

Q27.

P   Q   R

← 800 m →

Not to scale

The distance from point **P** to point **R** is 800 metres.

The distance from point **P** to point **Q** is **4 times** the distance from point **Q** to point **R**.

Olivia says,

It is 600 metres from point **P** to point **Q**.
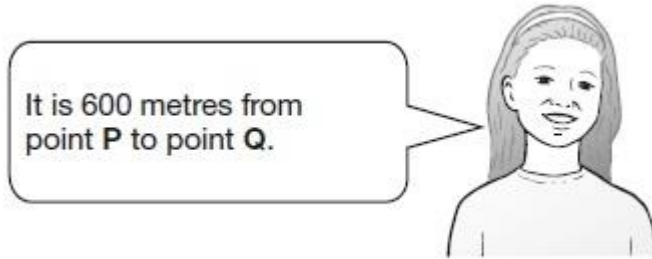
Explain why Olivia is **not** correct.
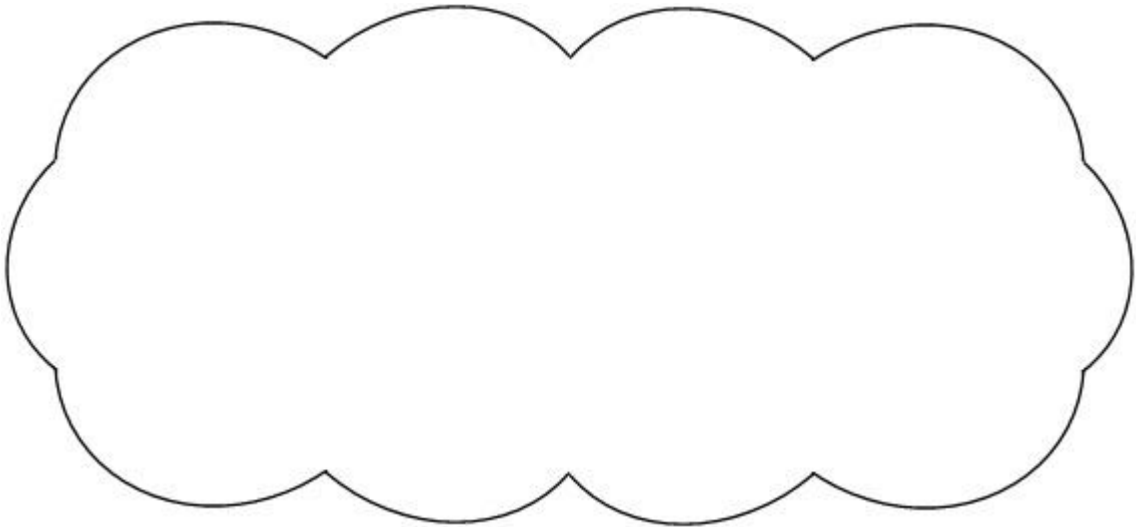
1 mark

Q28.

There are 28 pupils in a class.

The teacher has 8 litres of orange juice.

She pours 225 millilitres of orange juice for every pupil.

How much orange juice is left over?
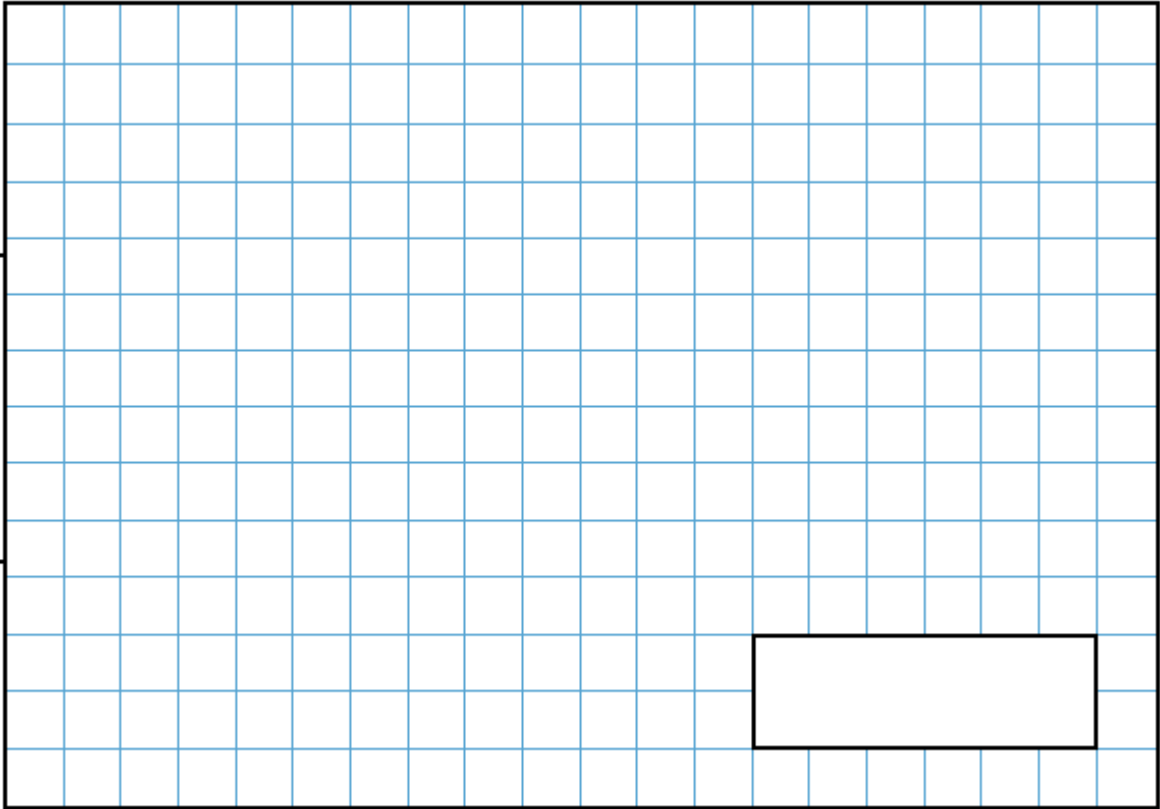
3 marks

Q29.

This is the net of a cube.

20 cm

Not actual size
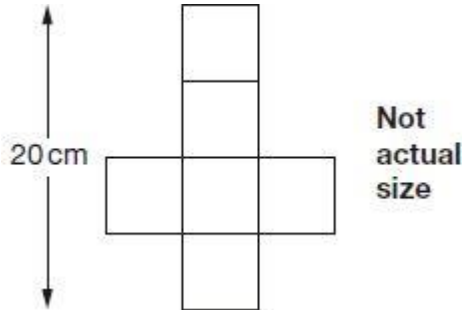
What is the **volume** of the cube?

cm^3

1 mark

Q30.

The length of a day on Earth is 24 hours.

The length of a day on Mercury is $58\frac{2}{3}$ times the length of a day on Earth.

What is the length of a day on Mercury, in **hours**?

Show your method

hours

2 marks

Q31.

Jack finished a sponsored run in 53 minutes 25 seconds.

Ally finished 3 minutes 50 seconds **after** Jack.

How long did Ally take?

min   sec

1 mark

Layla finished the run 8 minutes 45 seconds **before** Jack.

How long did Layla take?

min   sec

1 mark

Q32.

On a map, 1 cm represents 20 km.

0   20   40   60   80   100

kilometres
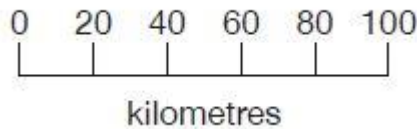
The distance between two cities is **250 km**.

On the map, what is the distance between the two cities?

cm

2 marks

Q33.

Cube A and cuboid B have the same volume.

Not to scale

A

6 cm

6 cm

6 cm

4 cm

B

?
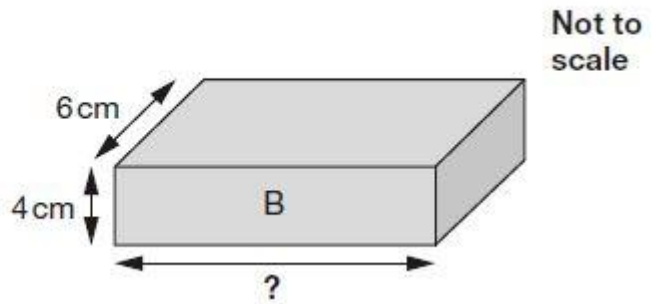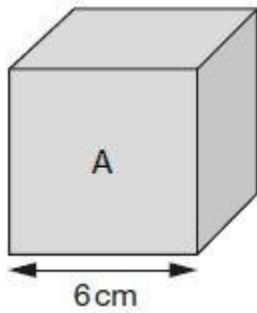
Calculate the missing length on cuboid B.

cm

2 marks

Q34.
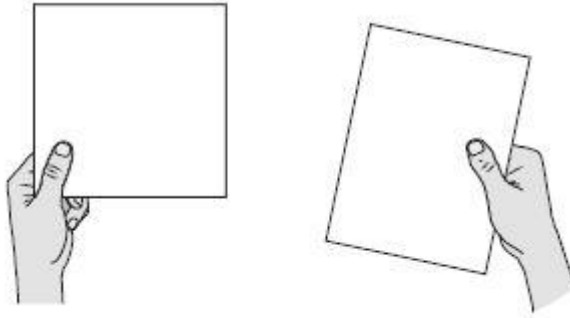
A square tile measures 20 cm by 20 cm.

A rectangular tile is 3 cm **longer** and 2 cm **narrower** than the square tile.

What is the **difference in area** between the two tiles?

Show your method

cm²

3 marks

Q35.

Miss Mills is making jam to sell at the school fair.

    Strawberries cost £7.50 per kg.
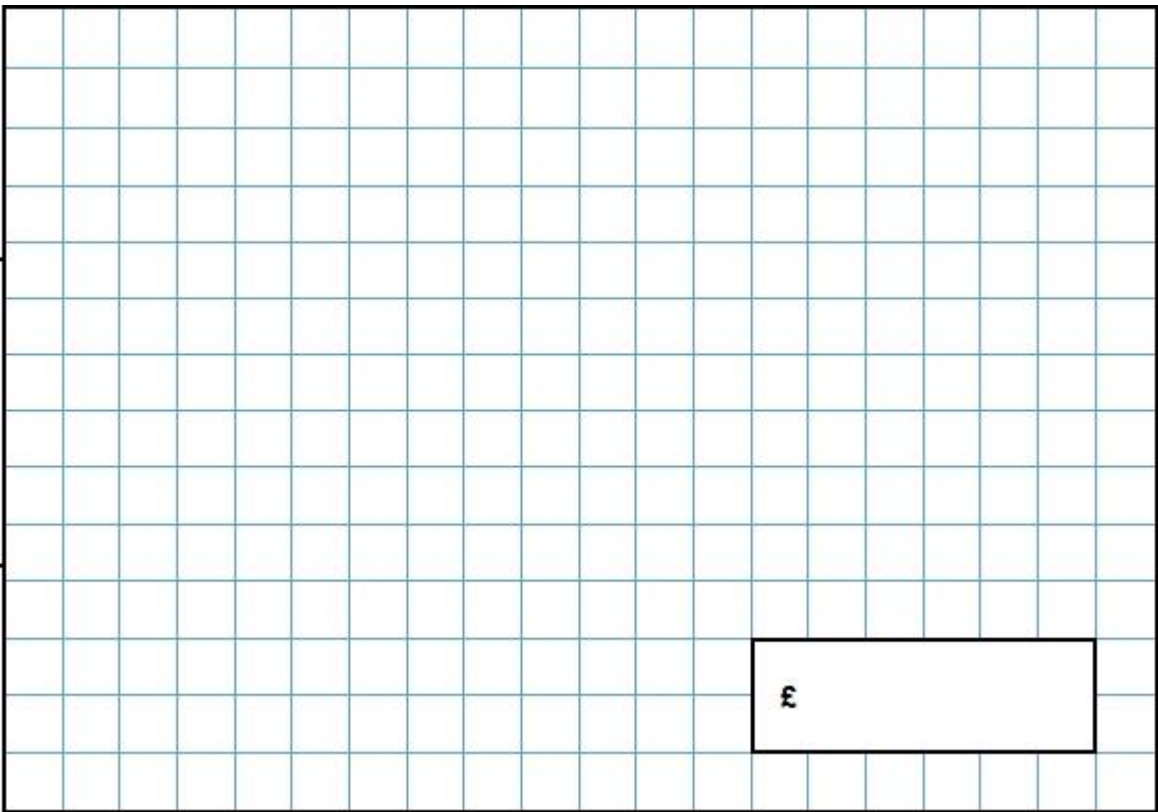
    Sugar costs 79p per kg.

    10 glass jars cost £6.90

She uses 12 kg of strawberries and 10 kg of sugar to make 20 jars full of jam.

Calculate the total cost to make 20 jars full of jam.

Show your method

£

3 marks

Mark schemes

Q1.

3 **AND** 5 **AND** 7

Numbers may be given in any order.

[1]

Q2.

All four pairs of prime numbers listed, ie:

- 5 and 31

  7 and 29

  13 and 23

  17 and 19

  For 2m, accept all prime numbers listed in pair order, ie:
  - *5, 31, 7, 29, 13, 23, 17, 19*

2

or

Three or four correct pairs of prime numbers listed and not more than one incorrect pair of numbers

For 1m, accept all eight prime numbers listed, and no other numbers, without any indication of how the numbers are paired, eg:
- *5, 7, 13, 17, 19, 23, 29, 31*

1

[2]

Q3.

49 **AND** 81

OR

121 **AND** 9

Numbers may be given in either order.

U1

[1]

Q4.

Award **TWO** marks for the correct answer of 378

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg:

- 366 369 372 375 378 381

364 371 378 385

OR

• Factorisation/calculator method, eg

$7 \times 3 = 21$

21×18

*Answer need not be obtained for the award of **ONE** mark.*

Up to 2
U1

[2]

Q5.

Award **TWO** marks for

Joe | **10** | **AND** | **16** |

Joe's even numbers may be given in either order.

AND

Dev | **9** | **AND** | **15** |

Dev's odd numbers may be given in either order.

If the answer is incorrect, award **ONE** mark for:

• three numbers correctly attributed

OR

• 9 **AND** 10 **AND** 15 **AND** 16 with some or all attributed to the wrong child.

Up to 2 (U1)

[2]

Q6.

An explanation which gives a counter-example to illustrate that two odd numbers and an even number can total 50, eg:

• '46 + 1 + 3 = 50'

• '20 + 15 + 15 works'

• '5 and 20 and 25'

OR

an explanation which recognises that two of the numbers could be odd, eg:

• 'You could use two odd numbers to make 10, and then add 40'

- 'Two of the numbers could be 1 and 3'

- 'Odd + odd + even = even'.

    No mark is awarded for circling 'No' alone.

    Do not *accept vague or incomplete explanations, eg:*

    - *'You can't divide it by 3'*

    - *'Odd + odd = even'.*

    If 'Yes' is circled but a correct, unambiguous explanation is given, then award the mark.

U1

[1]

Q7.

Award **TWO** marks for the correct answer of 60 **AND** 90

Numbers may be given in either order.

If the answer is incorrect, award **ONE** mark for:

- both numbers correct and one or more additional factors of 180

eg 30, 45, **60**, **90**

OR

- both numbers correct and one number which is not a factor of 180

eg **60**, **90**, 100

OR

- one number correct and none incorrect.

eg **60**

Up to 2

[2]

Q8.

| The first | **3** | multiples of | **10** | **add to 60** |

1

| The first | **4** | multiples of | **6** | **add to 60** |

or

| The first | **2** | multiples of | **20** | **add to 60** |

or

| The first | **1** | multiples of | **60** | **add to 60** |

1
U1

Q9.

Two numbers circled as shown:

74 ⟨72⟩ 73 74 ⟨75⟩

1

An explanation which recognises that 1003 is not a multiple of 3, eg:

- 'Because 1003 is not divisible by 3'

- 'Because 1003 is not a multiple of 3'

- 'Because 1003 is not in the 3 times table'

- 'Because I divided 1003 by 3 and there was a remainder'

- 'Because 1003 + 3 has a decimal answer'

- 'Because 1 + 0 + 0 + 3 = 4, and 4 is not a multiple of 3'

- 'Because 1003 has a digital sum of 4'

- 'Because 1002 is the nearest in the 3 times table'

- 'Because 1000 is not divisible by 3'

- 'Because 999 is divisible by 3'.

> ***Do not*** *award the mark if additional incorrect numbers are circled.*
> *Accept alternative unambiguous indications, eg ticks, crosses.*
> *No mark is awarded for circling 'No' alone.*
> ***Do not*** *accept vague or arbitrary explanations, eg:*
> - *'Because 1003 ends in 3'*
> - *'Because 1003 is in the third column'*
> - *'Because if you keep going in 3s you will go past it'.*
> *If 'Yes' is circled but a correct unambiguous explanation is given, then award the mark.*

U1

[2]

Q10.

Two numbers circled as shown:

⟨29⟩ 39 49 ⟨59⟩ 69

> ***Do not*** *award the mark if additional incorrect numbers are circled.*
> *Accept alternative unambiguous indications, eg numbers ticked, crossed or underlined.*

Q11.

36 **AND** 9

Numbers may be given in either order.

[1]

Q12.

An explanation which recognises that the sum of
adding three odd numbers is always odd, eg

- 'Because odd + odd + odd = odd';

- 'Because three odd numbers can't add up to an even number';

- 'Because an odd number of odd numbers makes an odd number'.

    Do not *accept numerical exemplification without further explanation, eg*
    - *'Because 21 + 23 + 7 = 51';*
    - *'Because 21 + 23 + 6 = 50'.*
    Do not *accept vague or arbitrary explanations, eg*
    - *'Because 50 is even';*
    - *'Because you can only do it with two odd numbers*

U1

[1]

Q13.

   OR

Accept the four numbers listed in any order.

U1

[1]

Q14.

5 and 6 written in the boxes in either order as shown:

OR

[1]

Q15.

0.01   0.05   (0.11)   0.2   0.9

Accept unambiguous alternatives, eg the number crossed or underlined.

[1]

Q16.

3 **AND** 7 **AND** 11

Accept numbers in any order.

[1]

Q17.

Explanation which recognises that
each number is one more than a multiple of 3, eg

- 'It starts at 1 and keeps adding 3 so it misses all the multiples of 3',

- 'Multiples of 3 are all 1 less than the numbers'.

No mark is awarded for circling 'Yes' alone.

Do not accept vague or arbitrary explanations such as
- *'They're too big';*
- *'It doesn't go far enough';*
- *'It is adding 3 all the time'.*

If 'No' is circled but a correct unambiguous explanation is given then award the mark.

[1]

Q18.

Any 3-difit number that is a multiple of 14, eg:

3	0	8

Any acceptable answers will be even numbers which divide by 7
Do not accept '0' in the hundreds box.
Only three digit numbers are acceptable.

[1]

Q19.

2 × 3 × 3 × 5

Numbers can be written in any order

[1]

Q20.

2^3 3^2 5^2 3^3

Accept 8, 9, 25, 27

Q21.

1^3 ~~2^3~~ ~~3^3~~ 4^3 ~~5^3~~

Accept any unambiguous indication

Q22.

Award **TWO** marks for the correct answer of 144

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g.

- $8 \times 6 = 48$
  $48 \div 4 = 13$ (error)
  $13 \times 13 = 169$

OR

Award **ONE** mark for:

- evidence for the side length of the square calculated correctly, i.e. 12

  *Answer need not be obtained for the award of **ONE** mark.*

Up to 2m

[2]

Q23.

Award **TWO** marks for the correct answer of 3.75

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g.

- $60 \div 4 = 15$
- $250 \times 15 = 3750$
- $3750 \text{ ml} \div 1000 =$

OR

- $250 \div 4 = 62.5 \text{ ml per second}$
- $62.5 \times 60 = 3750$
- $3750 \text{ ml} \div 1000 =$

OR

- $60 \div 4 = 15$, so there are 15 lots of 4 seconds in 1 minute so there are 15 bottles per minute.
- There are 4 bottles in 1 litre
- $15 \div 4 =$

  *Accept for **TWO** marks, 3,750 ml for final answer in working and the answer box blank **OR** 3,750 in the answer box where the litres has been replaced with millilitres.*

[2]

Q24.

Award **TWO** marks for the correct answer of 720

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g.

- 3 × 4 × 6 = 72
  8 × 9 × 11 = 792
  792 – 72 =

Award **ONE** mark for sight of 792

*Answer need not be obtained for the award of **ONE** mark.*

Up to 2m

[2]

Q25.

400

[1]

Q26.

10.5 (cm)

Accept $10\frac{1}{2}$

[1]

Q27.

An explanation that gives the correct values for PQ and/or QR, e.g.

- PQ = 640 m
- QR is 160, 160 times 4 is not 600 m
-

OR

An explanation recognising PR is 800 m and must be 5 times QR, e.g.

- the total distance is 800 m. Divide by 5 to give 160 for distance between Q and R, so P and Q is 4 × 160 = 640 m (not 600 m)
- if QR is 200 m, then PR is 1000 m not 800m
- if PQ is 600 m then QR is 800 − 600 = 200 m. Then PR is 5 × 200 = 1000 m but it is only 800 m.

OR

An explanation that PQ is not 600 m, e.g.
- if it was 600 m then the shorter distance would be 200 m if added to make 800 m, 600 m is 3 times 200, not 4 times
- Olivia is not correct because 600 ÷ 4 = 150 and 600 + 150 doesn't equal 800
- Olivia is not correct because 800 − 600 = 200 and 600 is not 4 times 200

> ***Do not*** *accept vague, incomplete or incorrect explanations, e.g.*
>> - *Olivia is not correct because you can't divide 600 by 4 like you can for 800*
>
> ***Do not*** *accept explanations which include incorrect mathematics or incorrect information that is relevant to the explanation.*

[1]

Q28.

Award **THREE** marks for the correct answer of 1.7 (litres) or 1,700 (ml).

If the answer is incorrect, award **TWO** marks for:

- sight of 6,300 **OR** 6.3 as evidence of the multiplication completed correctly

OR

- evidence of an appropriate complete method with no more than one error, e.g.

  - 28 × 225 = 6,300
    8 litres = 8,000 ml
    8,000 − 6,300 = 2,700 *(error)*

Award **ONE** mark for evidence of an appropriate method, e.g.

- 8,000 − 28 × 225 =

  > *Unit need not be given for the award of* ***THREE*** *marks. An incorrect unit is treated as one error.*
  >
  > *A misread may affect the award of marks. No marks are awarded if there is more than one misread or if the mathematics is simplified.*
  >
  > ***TWO*** *marks will be awarded for an appropriate complete method with the misread number followed through correctly.*
  >
  > ***ONE*** *mark will be awarded for evidence of an appropriate complete method with the misread number followed through correctly with one arithmetic error.*
  >
  > *If the answer reached in the first part of the calculation gives an answer greater than 8(L) or 8000(ml) and the smaller value is then subtracted from it,* ***ONE*** *mark may still be available.*
  >
  > *Answer need not be obtained for the award of* ***ONE*** *mark.*

Up to 3m

[3]

Q29.

125

Q30.

Award **TWO** marks for the correct answer of 1,408

OR

for an answer in the range of 1,406 to 1,409 inclusive.

If the answer is incorrect, award **ONE** mark for:

• sight of 1,392

OR

• evidence of an appropriate method, e.g.

• $24 \times 58\frac{2}{3}$ = answer

> *Within an appropriate method, if a decimal equivalent for $\frac{2}{3}$ is given, it must be rounded or truncated to at least 2 decimal places.*

• $24 \times 58 = 1,394$ *(error)*
$\frac{2}{3}$ of 24 = 16
1,394 + 16 = answer

• $24 \times \frac{176}{3}$ = answer
• 24×58.67 = answer.
> *A final answer is required for the award of **ONE** mark.*

Up to 2m

[2]

Q31.

(a) 57 min 15 sec
> *The answer is a time interval (see the guidance).*

1

(b) 44 min 40 sec

1

[2]

Q32.

Award **TWO** marks for the correct answer of 12.5

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g.

• $250 \div 20$

OR

- 20 km is 1 cm
  100 km is 5 cm
  50 km is 2.5 cm
  5 cm + 5 cm + 2.5 cm

*Answer need not be obtained for the award of **ONE** mark.*

***Do not** accept incorrect proportions in any step without evidence of the calculation performed.*

Up to 2m

[2]

Q33.

Award **TWO** marks for the correct answer of 9

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g.

- $6 \times 6 \times 6 = 216$
  $216 \div 6 = 36$
  $36 \div 4$

OR

- $216 \div 24$

*Answer need not be obtained for the award of **ONE** mark.*

Up to 2m

[2]

Q34.

Award **THREE** marks for the correct answer of 14

If the answer is incorrect, award **TWO** marks for:

- sight of 414 as evidence of 23×18 completed correctly

OR

- evidence of an appropriate method with no more than one arithmetic error, e.g.

  $20 \times 20 = 400$

$$
\begin{array}{r}
23 \\
\times\ 18 \\
\hline
230 \\
184 \\
\hline
314\ (error)
\end{array}
$$

  $400 - 314 = 86$

Award **ONE** mark for evidence of an appropriate method.

<div align="right">**Up to 3m**</div>

<div align="right">**[3]**</div>

Q35.

Award **THREE** marks for the correct answer of £111.70.

If the answer is incorrect, award **TWO** marks for:

• sight of £90 **AND** £7.90 **AND** £13.80 as all multiplication steps completed correctly.

> *Accept for **TWO** marks, sight of 9,000p **AND** 790p **AND** 1,380p as all multiplication steps completed correctly.*

OR

evidence of an appropriate complete method with no more than one arithmetic error, e.g.

```
      7.50            79             6.90
×       12      ×     10       ×        2
    88.80            790            13.80
   (error)
```

88.80 + 7.90 + 13.80 = 110.50

Award **ONE** mark for evidence of an appropriate complete method.

> *Answer need not be obtained for the award of **ONE** mark.*

> *A misread of a number may affect the award of marks. No marks are awarded if there is more than one misread or if the mathematics is simplified.*

> *TWO marks will be awarded if an appropriate complete method with the misread number is followed through correctly.*

> *ONE mark will be awarded for:*

> • *all multiplication steps completed correctly with the misread number.*

_OR_

- _evidence of an appropriate complete method with the misread number followed through correctly with no more than one arithmetic error._

Up to 3m

[3]