Selective High School Placement Test

Mathematical Reasoning

Explained answers for Practice Test 2

Janison.

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1 The two smallest numbers can be divided by 5 using knowledge of multiplication tables.

33 ÷ 5 = 6 with remainder 3 (since 5 × 6 = 30)
43 ÷ 5 = 8 with remainder 3 (since 5 × 8 = 40)

The larger numbers can be divided by 5 using a written method.

68 ÷ 5 = 13 with remainder 3
83 ÷ 5 = 16 with remainder 3
119 ÷ 5 = 23 with remainder 6

So the correct answer is **E** 119

Tip: We do not have to do the divisions if we remember that all multiples of 5 have either 0 or 5 as the last digit.
33, 43 and 83 are each 3 more than a multiple of 5 (30, 40 and 80), and 68 is 3 more than 65, so their remainders are all **3** when divided by 5.
119 is 4 more than 115, so its remainder is **4**. when divided by 5.

2 Look for a connection between each number and the next. We can see that:

2 × 3 = 6
and
54 × 3 = 162

so each number seems to be 3 times the previous number. Using this to work out the third number, we get:

6 × 3 = 18

and then 18 × 3 = 54 which matches the fourth number.

So the correct answer is **C** 18

3 Bob has placed the protractor in an unusual way, but we can still measure the angle. It is the difference between the protractor readings at the two straight sides.

We can use the inner scale or the outer scale, but we must use the same one for both readings. Using the outer scale:

160° − 50° =110°

(or using the inner scale: 130° − 20° =110°)

So the correct answer is **A** 110°

4 When Jason chooses a pair of trousers, there are 4 different shirts to choose from.
So there are 4 different outfits for each pair of trousers.
He has 3 pairs of trousers, so he has 3 × 4 = **12** different outfits.

When Emily chooses a pair of trousers, there are 5 different shirts to choose from.
There are 5 different outfits for each pair of trousers.
She has 2 pairs of trousers, so she has 2 × 5 = **10** different outfits.

So the correct answer is **A** Jason has 2 more outfits than Emily.

5 It is helpful to convert container Z's volume into litres (L) and millilitres (mL).
There are 1000 millilitres (mL) in one litre (L), so container Z has 1 L 250 mL

Adding up the whole litres in each container:
1 L + 3 L + 1 L = **5 L**

Adding up the millilitres in each container:
75 mL + 45 mL + 250 mL = **370 mL**

So the correct answer is **B** 5 L 370 mL

6 Tenths (in the first place after the decimal point) are larger than hundredths (in the second place). So to compare decimals:

- First compare the tenths. If one number has more tenths, it must be larger.
- If both numbers have the same number of tenths, compare the hundredths. The number with more hundredths is larger.

For example:

- 0.6 is larger than 0.56 because 0.6 has more tenths.
- 0.76 is larger than 0.75 because both have 7 tenths but 0.76 has more hundredths.

Tip: We can write 0 in an empty hundredths place. For example, 0.5 is the same as 0.50. If all of the numbers have two digits after the decimal point, we can compare their sizes by ignoring the decimal point. For example, 56 is bigger than 50, and 0.56 is bigger than 0.50.

The numbers in increasing order are:

0.5, 0.56, 0.57, 0.6, **0.65**, 0.67, 0.7, 0.75, 0.76

There are nine cards, so the middle card is the fifth card.

So the correct answer is **B** 0.65

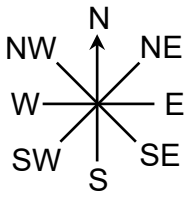
7 The probability of picking a red marble is $\frac{1}{2}$, so half of the marbles must be red.
Half of 36 is 18, so there are **18** red marbles.

We also know there are **16** blue marbles.

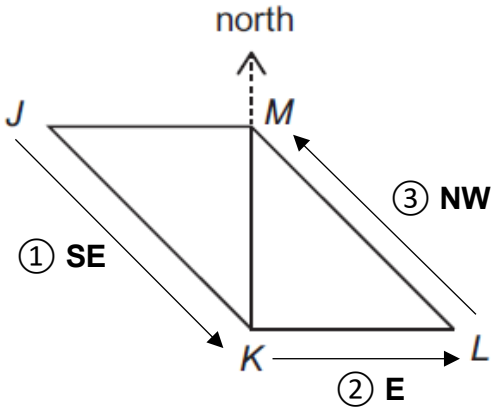
The rest of the marbles are yellow, so the number of yellow marbles is 36 − **18** − **16** = 2.

So the correct answer is **A** 2

8 To answer this question, we need to use compass directions:



The diagram shows the directions Bryony follows, with numbers showing the order.



So the correct answer is **A** SE, then E, then NW

9 Think about one statement at a time.

Statement X: $\frac{3}{4}+\frac{3}{4}$ is more than $1\frac{1}{4}$

$$\frac{3}{4}+\frac{3}{4}=\frac{6}{4}$$

and

$$1\frac{1}{4}=\frac{4}{4}+\frac{1}{4}=\frac{5}{4}$$

Six quarters is more than five quarters.
Statement X is correct.

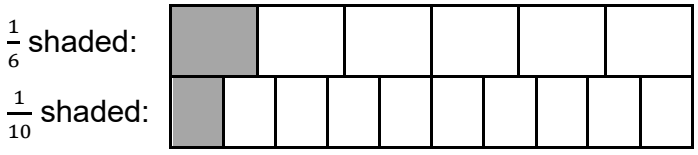
Statement Y: $1-\frac{3}{8}$ is less than $\frac{3}{8}$

$$1-\frac{3}{8}=\frac{8}{8}-\frac{3}{8}=\frac{5}{8}$$

Five eighths is more than three eights.
Statement Y is incorrect.

Statement Z: $\frac{1}{6}$ is more than $\frac{1}{10}$

If 1 is divided into 6 equal parts, one of those parts is $\frac{1}{6}$.
If 1 is divided into 10 equal parts, one of those parts is $\frac{1}{10}$.
$\frac{1}{6}$ is more than $\frac{1}{10}$. The bar diagram also shows this.



Statement Z is correct.

So the correct answer is **D** statements X and Z only

10 In the prism:

- Each triangle edge meets a short side of a rectangle.
- The long edge of each rectangle meets the long edge of another rectangle.
- Each edge meets only one other edge.

Net 1:
Look at the triangle at the bottom: one of its edges is joined to a long edge of a rectangle, instead of a short edge.

Net 1 cannot make the prism.

Net 2:
The two triangles are touching, so they will not be at opposite ends of the prism when the net is folded. (Also, the faces in a net join along edges, not just at a single point.)

Net 2 cannot make the prism.

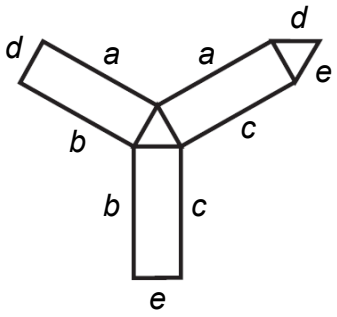
Net 3:
When this net folds, the triangles will overlap. They should be at opposite ends of the prism.

Net 3 cannot make the prism.

Net 4:
When this net folds:

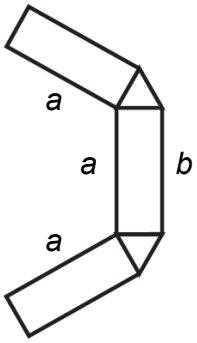
- each edge of a triangle will meet a short edge of a rectangle
- each long edge of a rectangle will meet a long edge of another rectangle.

In the diagram below, edges with the same letter label will meet.



Net 4 can make the prism.

Net 5:
When this net folds, the top and bottom rectangles will overlap. In the diagram below, the three edges labelled *a* will all meet, and no edge will meet the edge labelled *b*.



Net 5 cannot make the prism.

So the correct answer is **B** net 4 only

11 A square has four sides of equal length. The length of one side of the square is 32 cm ÷ 4 = 8 cm.

Each side of a smaller square is 4 cm long: half as long as the side of the large square.

The perimeter of a smaller square is 4 × 4 cm = 16 cm.

So the correct answer is **C** 16 cm

12 Look at these results of dividing even numbers by 8:

8 ÷ 8 = 1 with no remainder
10 ÷ 8 = 1 with remainder 2
12 ÷ 8 = 1 with remainder 4
14 ÷ 8 = 1 with remainder 6
16 ÷ 8 = 2 with no remainder
18 ÷ 8 = 2 with remainder 2
20 ÷ 8 = 2 with remainder 4
22 ÷ 8 = 2 with remainder 6
24 ÷ 8 = 3 with no remainder

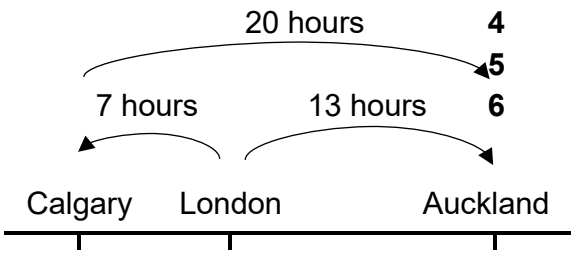
Tip: Another way to find the answer is to notice that all multiples of 8 are even. So any even number is either:

- a multiple of 8 (and has no remainder when divided by 8)
- or a multiple of 8 + an even number, because even + even = even (and so it has remainder 2, 4 or 6 when divided by 8).

There is a repeating pattern. The possible remainders are 2, 4, 6.

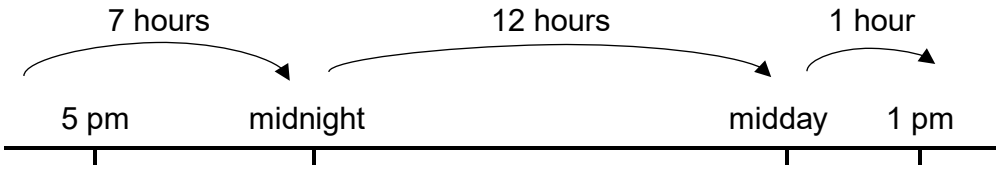
So the correct answer is **C** 2, 4, 6

13 Calgary is 7 hours behind London, and Auckland is 13 hours ahead of London.
So Auckland is 20 hours ahead of Calgary, as shown below.



When it is 5 pm in Calgary, it is 20 hours later in Auckland.
7 hours after 5 pm is midnight.
12 hours after midnight it is midday.

1 hour after midday it is 1 pm.
The diagram below shows this.



So the correct answer is **C** 1 pm

14 1 peck = 8 quarts.
8 quarts = 16 pints, because half a quart = 1 pint and 8 quarts equal 16 half-quarts.
16 pints = 64 gills, because 1 pint = 4 gills and so 16 pints = 16 × 4 gills.

So the correct answer is **E** 64

15 \$70.2☐ is more than \$68.5△.
The greatest possible difference is when \$70.2☐ is as large as possible and \$68.5△ is as small as possible.

The largest possible value of \$70.2☐ is \$70.29.
The smallest possible value of \$68.5△ is \$68.50.

The difference is \$70.29 − \$68.50 = \$1.79.

So the correct answer is **B** \$1.79

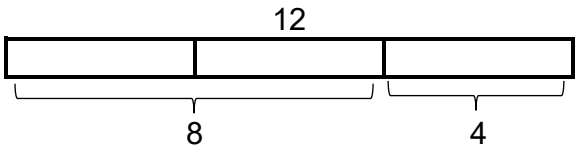
Tip: One way to find \$70.29 − \$68.50 is to count up from \$68.50:
50 cents more than \$68.50 is \$69.00
1 dollar more than \$69.00 is \$70.00
29 cents more than \$70.00 is \$70.29
50 cents + 1 dollar + 29 cents = \$1.79

16 On the scale of the graph, 5 children are represented by 5 divisions.
So 1 child is represented by 1 division.

The graph shows 10 + 15 + 1 + 1 + 1 = **28** children.

There are 40 children altogether, so the number of children missing from the graph is 40 − **28** = **12**. These are the children with two or three pets.

The number of children with two pets is twice the number with three pets.
We need to split **12** into two numbers, so that one number is twice the other:



The number of children with two pets is 8.

So the correct answer is **C** 8

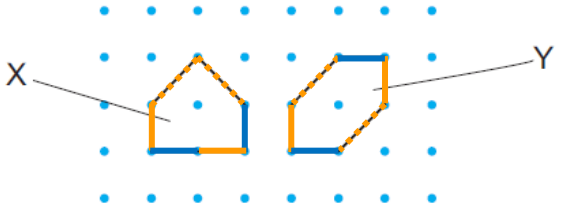
17 Gabriella has twice as many stickers as Hassan.

Finn has 8 times as many stickers as Gabriella.

Combining these two facts, Finn has 8 × 2 = 16 times as many stickers as Hassan.

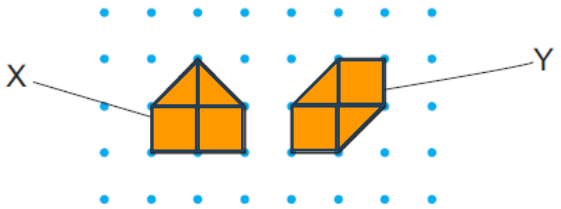
So the correct answer is **E** 16

18 The perimeters of the shapes are:
X: 4 square side lengths + 2 square diagonal lengths
Y: 4 square side lengths + 2 square diagonal lengths.
The diagram below shows this, with a solid line for each square side and a dotted line for each square diagonal.



The perimeters are equal.

The areas of the shapes are:
X: 2 whole squares and 2 half squares
Y: 2 whole squares and 2 half squares.
The diagram below shows this.



The areas are equal.

So these statements are correct:
2 Shapes X and Y have the same perimeter.
4 Shapes X and Y have the same area.

So the correct answer is **E** statements 2 and 4 only

19 Two large packets hold 36 × 2 = 72 biscuits.
Three medium packets hold the same number, 72 biscuits.
So one medium packet holds 72 ÷ 3 = 24 biscuits.

Two medium packets hold 24 × 2 = 48 biscuits.
Three small packets hold the same number, 48 biscuits.
So one small packet holds 48 ÷ 3 = 16 biscuits.

So the correct answer is **E** 16

20 Buying 10 mandarins separately costs 10 × \$0.50 = \$5.
Buying a bag of 10 mandarins costs less than this.

Buying 30 mandarins in 3 bags of 10 costs 3 × \$4.50 = \$13.50.
Buying a bag of 30 mandarins costs less than this.

Jack can buy the most mandarins if he buys them at the lowest possible price each.

He can only buy one bag of **30** mandarins, for $13.00.
Then he has $25 − $13 = $12 left.

He can then buy **20** mandarins in two bags of 10, for 2 × $4.50 = $9.00.
Then he has $12 − $9 = $3 left.

He can then buy **6** separate mandarins, for 6 × $0.50 = £3.00.
Then he has no money left.

Jack can buy **30** + **20** + **6** = 56 mandarins altogether.

So the correct answer is **D** 56

21 We can think about one statement at a time.

Statement X:
In some parts of the graph, the fraction of nitrogen is higher than the fraction of helium, but in some parts of the graph – between about 320 km and 60 km above sea level – the fraction of nitrogen is lower than the fraction of helium
So statement X is incorrect.

Statement Y:
There is only one place on the graph where oxygen and helium have the same fraction at the same height: a fraction of just under $\frac{1}{2}$ at about 460 km above sea level.
So statement Y is incorrect.

Statement Z:
At 200 km above sea level, the fraction of nitrogen is close to $\frac{1}{2}$ and the fraction of oxygen is close to $\frac{1}{2}$.
So statement Z is correct.

So the correct answer is **D** statement Z only

22 On Thursday, the movie theatre sold 80 tickets.
So the total number it sold on the other three days was 500 – 80 = **420**.

Using 'Mon', 'Tues' and 'Wed' to mean the number of tickets sold on each of those days:

Tues is half of Mon, and Wed is half of Tues.
So Mon is 2 × Tues, and Tues is 2 × Wed.
So Mon is 4 × Wed.
So Mon, Tues and Wed altogether equal 7 × Wed.

420 ÷ 7 = 60, so 60 tickets were sold on Wednesday.

On Monday, the number of tickets sold was 4 × Wed = 4 × 60 = 240.

So the correct answer is **E** 240

23 The boxes in column D contain numbers 3, 6, 9…

These are multiples of 3.

So later boxes in the pattern in column D will contain 30, 33, 36 and 39.
Box 40 will be next, in column **B**.

For each box in the pattern, the number in the box is 1 less than the number of its row.
So the row number of box 40 will be **41**.

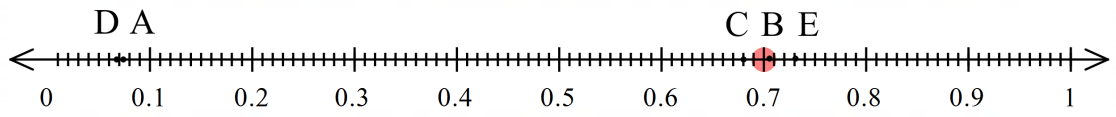
So the correct answer is **A** B41

24 Seven tenths written as a decimal is 0.7. It can also be written as 0.70 or 0.700.

In order, the numbers are:

0.069, 0.072, 0.68, 0.705, 0.73

The approximate positions of the numbers are shown by their letters below:



0.7 is greater than 0.68 and smaller than 0.705:

0.069, 0.072, 0.68, **0.7**, 0.705, 0.73

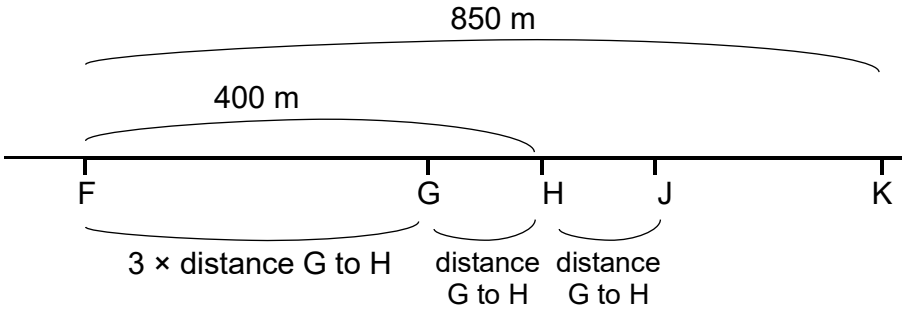
0.70 is 0.02 greater than 0.68.
0.705 is only 0.005 greater than 0.700.

So 0.705 is closest to $\frac{7}{10}$.

So the correct answer is **B** 0.705.

25 We can use the first letters of the names to represent the five friends: F, G, H, J, K.

The diagram below shows the information given in the question.
The distance from F to G is three times the distance from G to H, which equals the distance from H to J.



The distance from F to H, 400 m, is 4 × the distance from G to H.
So the distance from G to H is 400 ÷ 4 = 100 m.
The distance from H to J is the same, 100 m.

The distance from J to K is:

distance from F to K − distance from F to H − distance from H to J =
850 m − 400 m − 100 m = 350 m.

So the correct answer is **C** 350 m

26 When Rachel is on the start line, she has run for a multiple of 8 minutes.
When Steve is on the start line, she has run for a multiple of 10 minutes.
When Taran is on the start line, she has run for a multiple 12 minutes.

A time when they are all on the start line must be a common multiple of 8, 10 and 12.
The time when they are next on the start line is the lowest common multiple of 8, 10 and 12.

One way to find the lowest common multiple is to write the multiples of each number in order and look for a multiple they all share:

8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96, 104, 112, **120**…
10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, **120**…
12, 24, 36, 48, 60, 72, 84, 96, 108, **120**…

Tip: If you know the multiples of 8 and 12, then it is quicker to list the multiples of 10, looking for the lowest that is also a multiple of 8 and 12.

So the correct answer is **E** 120

27 Multiplying the number by 3 gives an answer less than 30. The whole numbers that fit this rule are the numbers 1 to 9:

3 × 1 = 3
3 × 2 = 6
.
.
.
3 × 9 = 27
3 × 10 = 30

Multiplying the number by 6 gives an answer greater than 40. The whole numbers that fit this rule are the numbers 7 and above:

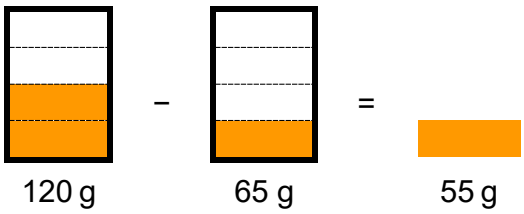
6 × 6 = 36
6 × 7 = 42
6 × 8 = 48
6 × 9 = 54
.
.
.

The numbers that fit both rules are 7, 8 and 9.

The sum of the numbers Mateo could be thinking of is 7 + 8 + 9 = 24.

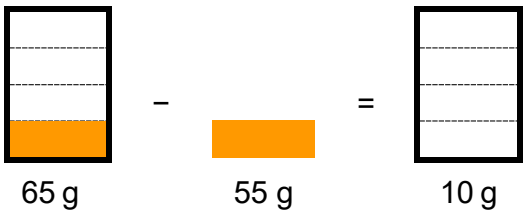
So the correct answer is **E** 24

28 The mass of half-can of sweetcorn + can is 120 g.
The mass of quarter-can of sweetcorn + can is 65 g.
The difference is a quarter-can of sweetcorn, which weighs 120 g – 65 g:

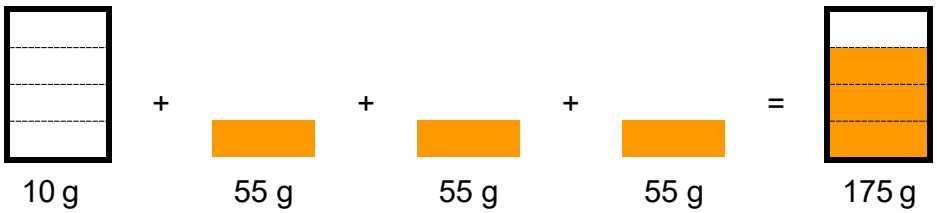


Tip: After this step, a quicker method is to add a quarter-can of sweetcorn, with mass 55 g, to the half-full can of sweetcorn, 120 g, to make a three-quarter full can:
55 g + 120 g = 175 g

The mass of the empty can is the quarter-full can minus the quarter-can of sweetcorn:

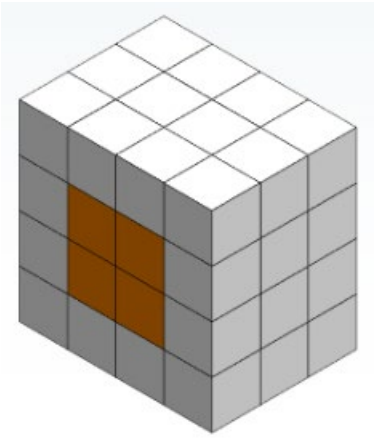


The mass of a three-quarters-full can of sweetcorn is the empty can plus three quarter-cans of sweetcorn:

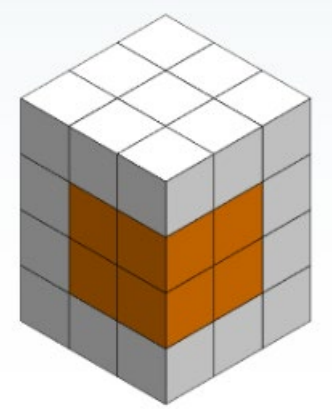


So the correct answer is **B** 175 g

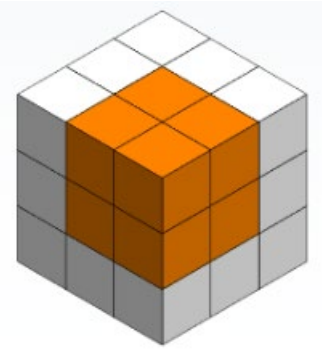
29 If we remove the front layer of small cubes, we can see four cubes behind it that Tiffany could not see before. These are coloured orange in the diagram:



If we remove the right-hand layer, we can see another two cubes that Tiffany could not see before.



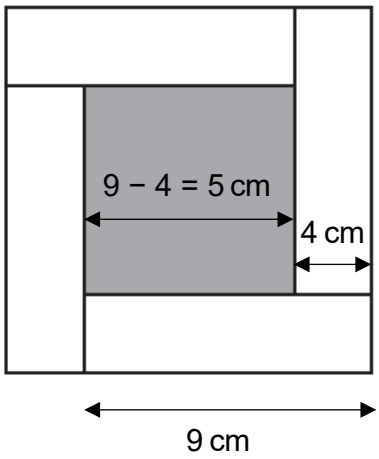
There is a cube made of 8 smaller cubes inside the large cube. Tiffany could not see any of these.



So the correct answer is **B** 8

30 The area of a rectangle is length × width.
So the length of each white rectangle is area ÷ width = 36 cm^2 ÷ 4 cm = 9 cm.

These measurements can be used to find that the width of the square is 5 cm:



The area of the square is 5 cm × 5 cm = 25 cm^2.

So the correct answer is **C** 25 cm^2

31 The second bus of the day from Newtown to Oldville departs at **09:55**:

Oldville to Newtown		Newtown to Oldville	
depart 07:55	arrive 09:05	depart 07:15	arrive 08:20
depart 10:20	arrive 11:25	**depart 09:55**	**arrive 11:05**
depart 15:35	**arrive 16:45**	depart 13:05	arrive 14:!5
depart 18:05	arrive 19:00	depart 17:30	arrive 18:30

Sun-mi arrives in Oldville at 11:05.

The next bus back from Oldville departs at 15:35. This arrives in Newtown at **16:45**.

Sun-mi leaves Newtown at **09:55** and arrives back in Newtown at **16:45**.
The time she spends away from Newtown is the difference between these two times.

From 09:55 to 10:00 is 5 minutes.
From 10:00 to 16:00 is 6 hours.
From 16:00 to 16:45 is 45 minutes.

The total time is 6 hours 50 minutes.

So the correct answer is **D** 6 hours 50 minutes

32 The container has five divisions from 0 to 100 mL, so one division represents 100 mL ÷ 5 = 20 mL.

There is 120 mL of syrup in the container at the start.
The total mass of the container and 120 mL of syrup is 270 g.

The amount of syrup poured out is 120 mL − 40 mL = **80 mL**.
The mass of this syrup is 270 g − 150 g = 120 g.

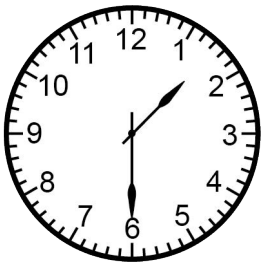
If **80 mL** of syrup has mass 120 g, then 40 mL of syrup has half of this mass, **60 g**.

In the second picture, the mass of the container plus 40 mL of syrup is 150 g.
So the mass of the container is 150 g − **60 g** = 90 g.

So the correct answer is **B** 90 g

33 The picture shows that the angle between one hour and the next hour on the clock face is 30°.

At 1:30 pm, the minute hand will point to 6 and the hour hand will point halfway between 1 and 2. There will be four and half hours between the hands:



The angle between the hands will be 4 × 30° + half of 30° = 120° + 15° = 135°.

So the correct answer is **D** 135°

34 If 40 is the lowest common multiple (LCM) of the two numbers, they must both have 40 as a multiple. The numbers that have 40 as a multiple are all the factors of 40:

1, 2, 4, 5, 8, 10, 20, 40

If 4 is the highest common factor (HCF) of the two numbers, they must both have 4 as a factor. The numbers from the list above that have 4 as a factor are:

4, 8, 20, 40

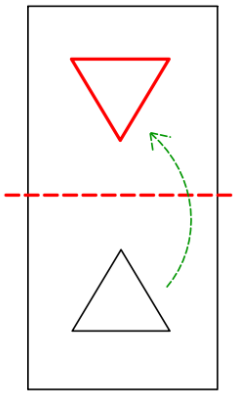
The question gives 4 and 40 as a possible pair, so look for a different pair:

4 and 40: this pair is already given in the question ×
4 and 8: LCM is 8, not 40 ×
8 and 40: HCF is 8, not 4 ×
8 and 20: HCF is 4 and LCM is 40 ✓

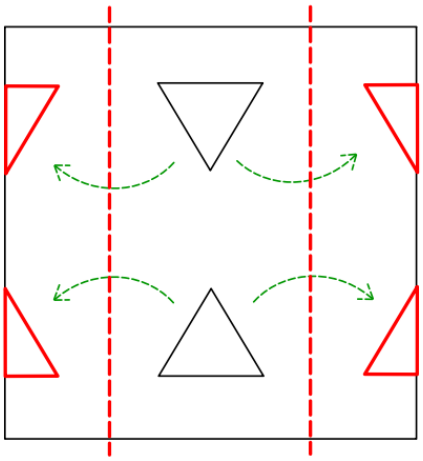
The two numbers are 8 and 20, and their sum is 28.

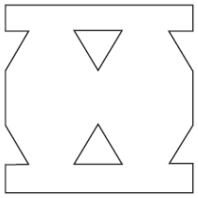
So the correct answer is **D** 28

35 Undoing the second fold will give a rectangular piece of paper with the original triangle reflected in the fold line (which is shown dotted below):



Undoing the first two folds will reflect each half of these triangles in a vertical fold line:





So the correct answer is **A**