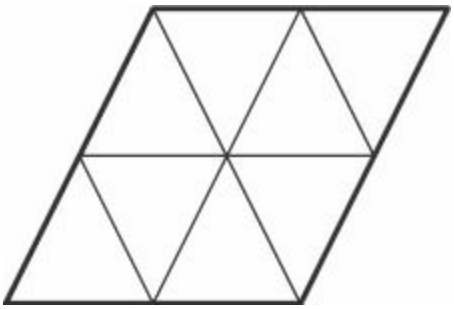
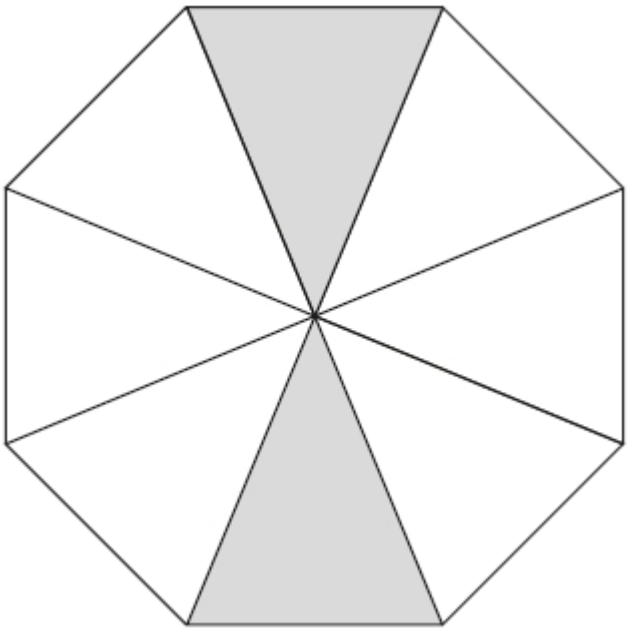
1. Colour $\frac{1}{2}$ of this shape.



1 mark

2. This shape is divided into equal parts.

What fraction of this shape is shaded?

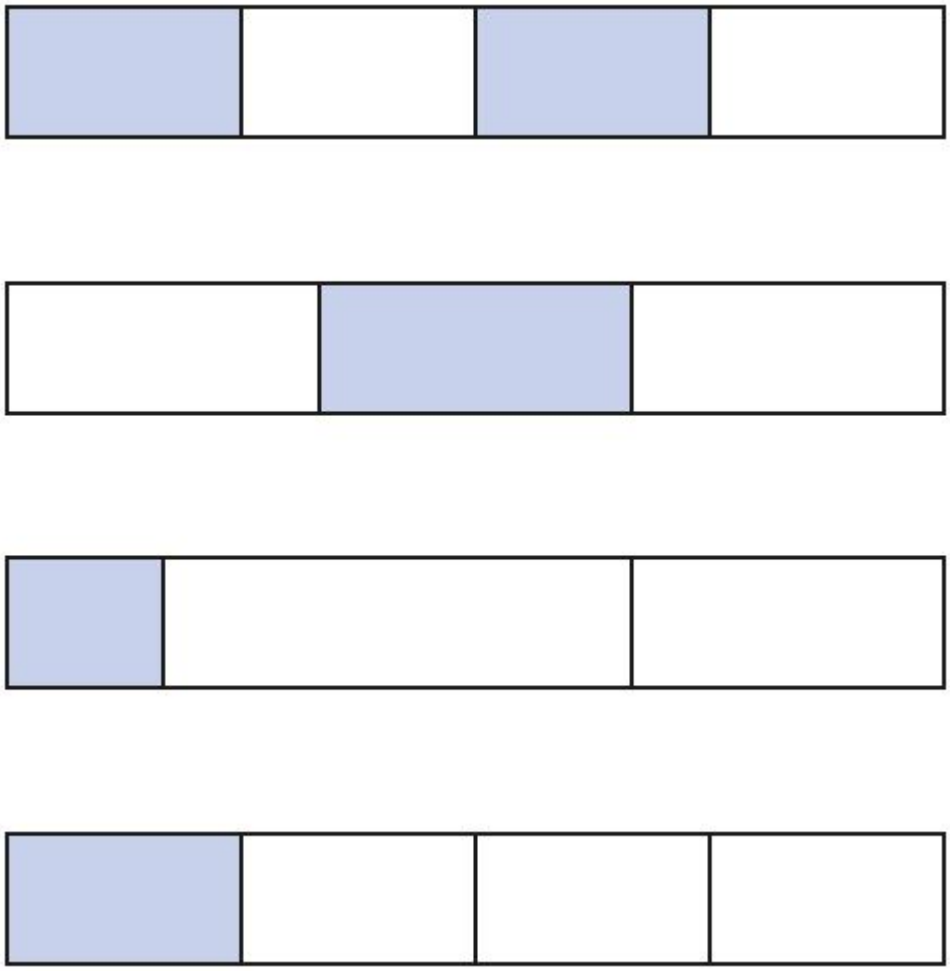


1 mark

3. Circle $\frac{1}{3}$ of the apples below.

1 mark

4. Tick the shape that has exactly $\frac{1}{3}$ shaded.

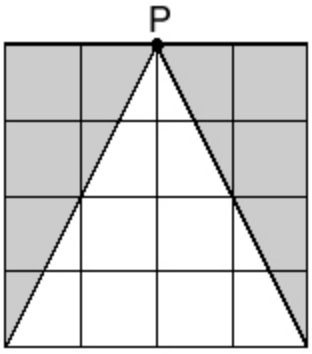


1 mark

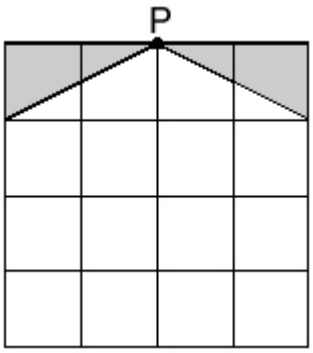
5. **Fractions**

In this question, each diagram is drawn on a square grid.

$\frac{1}{2}$ of this diagram is shaded.

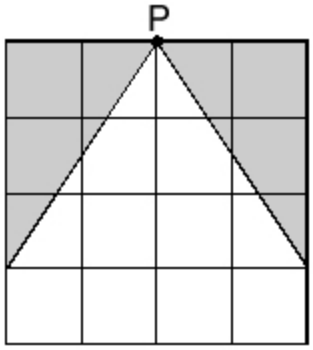


(a) Explain how you know $\frac{1}{8}$ of this diagram is shaded.



1 mark

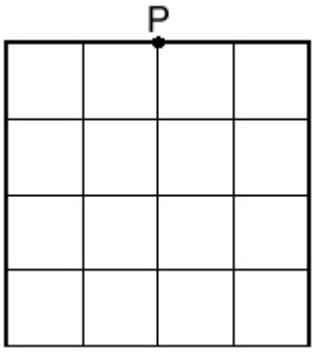
(b) What fraction of this diagram is shaded?



1 mark

(c) **Shade** $\frac{3}{4}$ of this diagram.

You must use on **two straight lines**, and **both** of the lines must **start at point P**.



1 mark

6. A shop has 12 bags of crisps.

It sells $\frac{1}{4}$ of the bags.

How many bags of crisps did the shop **sell**?

bags

1 mark

7. **Using fractions**

Complete the table.

The first one is done for you.

The number of **quarters** in $1\frac{1}{4}$	5 _____
The number of **quarters** in $4\frac{1}{2}$	
The number of **tenths** in $3\frac{3}{10}$	
The number of **tenths** in $3\frac{3}{5}$	

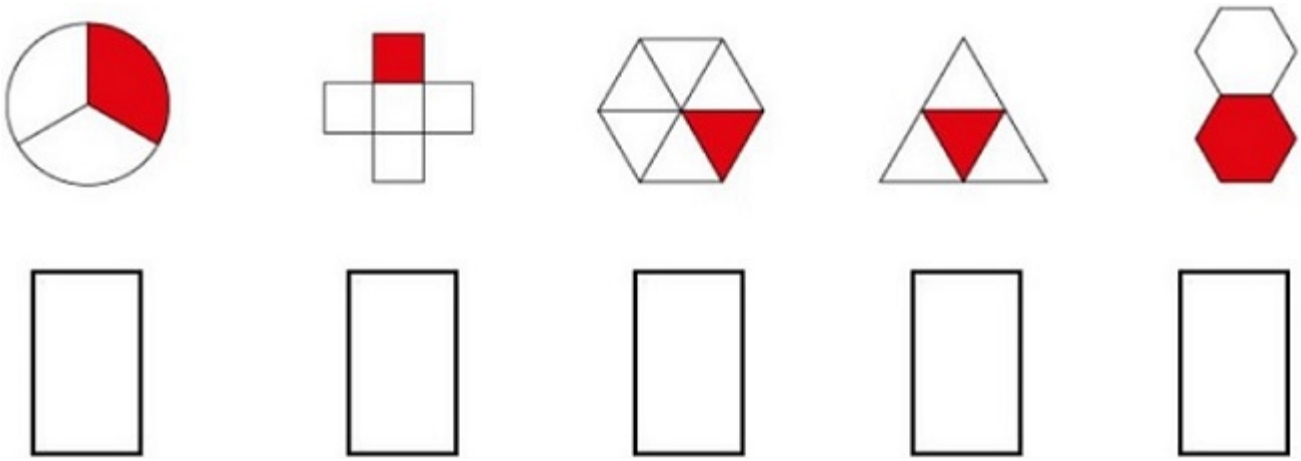
3 marks

8. Write the missing number to make this correct.

$\frac{1}{4}$ of 24 = $\frac{1}{2}$ of ☐

1 mark

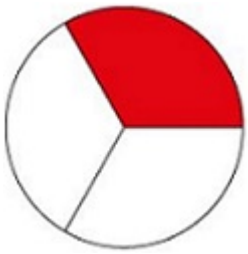
9. What fraction of each diagram is shaded?



2 marks

10. Pupils should learn that when a whole is divided into equal parts, fraction notation can be used to describe the size of each equal part relative to the whole. Because it is the size of a part relative to the whole which determines the value of a fraction, it is important that pupils talk about, and identify, both the whole and the part from the start of their work on fractions. They should not begin, for example, by talking about '1 out of 3 parts' without reference to a whole.

Pupils should begin by working with concrete resources and diagrams. First they should learn to identify the whole and the number of equal parts, then to describe one particular equal part relative to the whole.



A circle divided into 3 equal parts, with one part shaded

Language focus

"The whole is divided into 3 equal parts. 1 of these parts is shaded."

Pupils must be able to use this precise language to describe a unit fraction of a:

- shape / area (as in the above example)
- measure (for example, a length of ribbon or a beaker of water)
- set (for example, a group of sheep where all are white except one, which is black)

Pupils should then learn to interpret and write unit fractions, relating to these contexts, using mathematical notation. They should continue to describe the whole, the number of parts and the particular part, and relate this to the written fraction.

Say	Write
“The whole has been divided…”	The fraction bar: –
“…into 3 equal parts.”	The denominator: **3**
“1 of these parts is shaded.”	The numerator: **1**

Language focus

“The whole is divided into 3 equal parts. Each part is one-third of the whole.”

A clear understanding of unit fractions is the foundation for all future fractions concepts. Pupils should spend sufficient time working with unit fractions to achieve mastery before moving on to non-unit fractions.

Pupils should learn that a non-unit fraction is made up of a quantity of unit fractions. They should practise using unitising language to describe, for example, 5 eighths as 5 one-eighths (here, we are unitising in eighths).

Language focus

“The whole is divided into 8 equal parts and 5 of those parts are shaded.

$\frac{5}{8}$ of the shape is shaded. $\frac{5}{8}$ is 5 one-eighths.”

Pupils should also experience examples where all parts of the shape are shaded (or all parts of the measure or set are highlighted) and the numerator is equal to the denominator. They should understand, for example that $\frac{5}{5}$ represents all 5 equal parts, and is equivalent to the whole.

Teaching should draw attention to the fact that in order to identify a fraction, the parts need to be equal. Comparing situations where the parts are equal and those where they are not is a useful activity (see **3F–1**, questions 2 and 4).

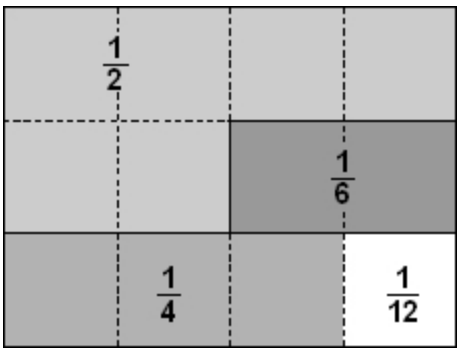
Making connections

Showing, describing and representing a unit fraction of a shape, measure or set involves dividing it into a number of equal parts. The theme of dividing a quantity into a given number of equal parts runs through many topics, including:

- partitive division (**3MD–1**)
- finding a unit fraction of a value using known division facts (**3F–2**).

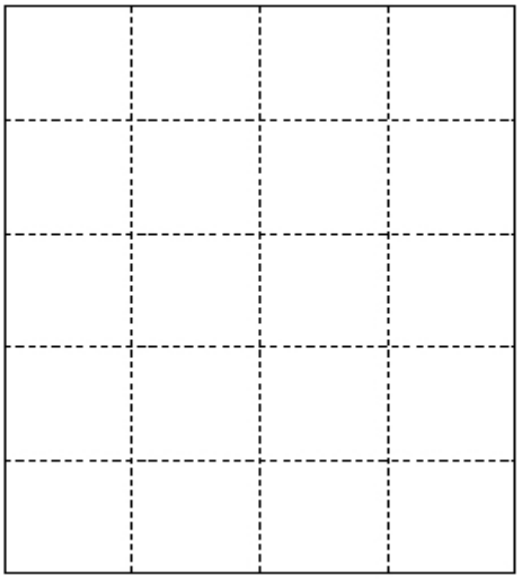
11. **Unit fractions**

The diagram shows that $\frac{1}{2}+\frac{1}{4}+\frac{1}{6}+\frac{1}{12}=1$



Draw lines on the rectangle below to show that $\frac{1}{2}+\frac{1}{4}+\frac{1}{5}+\frac{1}{20}=1$

Label each part with its fraction.

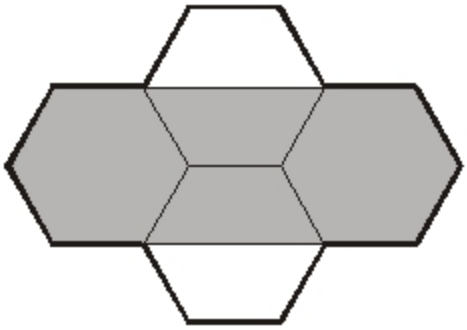


2 marks

12. **Regular hexagons**

(a) This shape is made from regular hexagons.

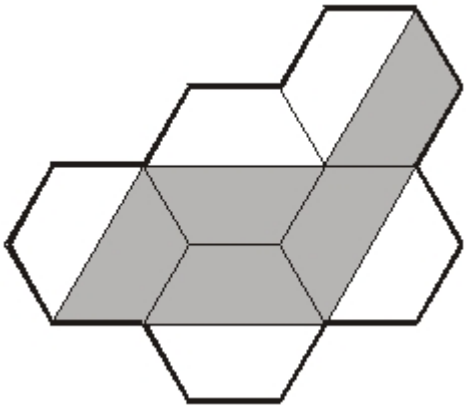
What **fraction** of the shape is shaded?



1 mark

(b) This shape is also made from regular hexagons.

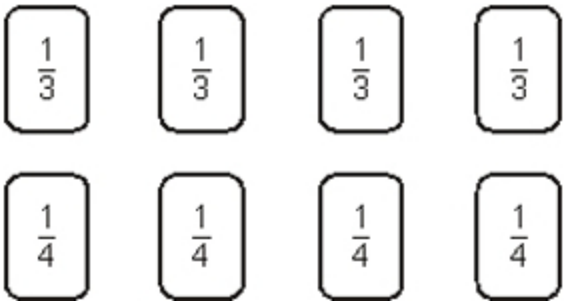
What **fraction** of the shape is shaded?



1 mark

13. **Fraction cards**

Here are some fraction cards.

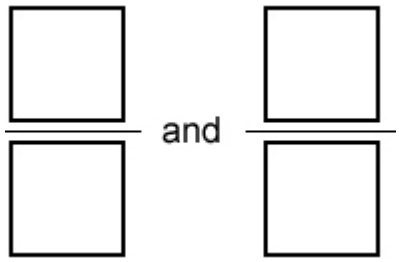


Use **five** of these cards to make a total of $1\frac{1}{2}$

1 mark

14. **Half and one**

Write two **different** fractions that are greater than $\frac{1}{2}$ but less than 1

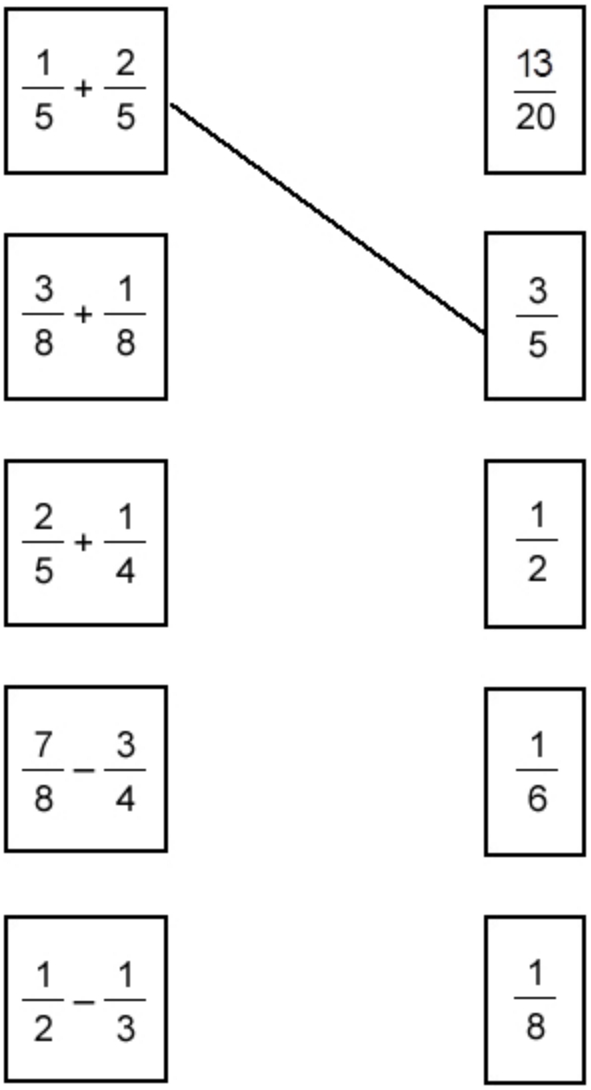


2 marks

15. **Fractions**

(a) Match each calculation with the correct fraction answer.

The first one is done for you.



2 marks

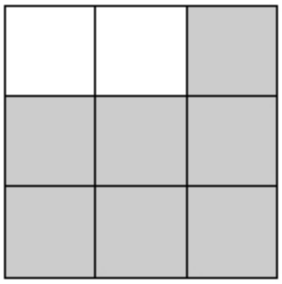
(b) Work out $\frac{1}{2} + \frac{1}{3}$

1 mark

16. **Square grid**

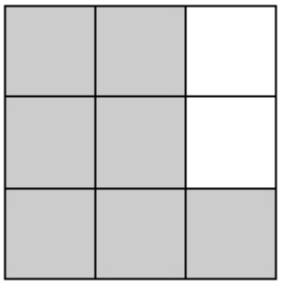
Part of a square grid is shaded.

(a) **What fraction** of the grid is shaded?

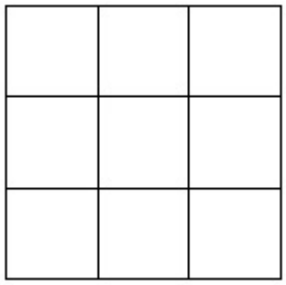


1 mark

The diagram shows the same grid after a **quarter turn clockwise**.



(b) Shade this diagram to show the grid after **another** quarter turn clockwise.



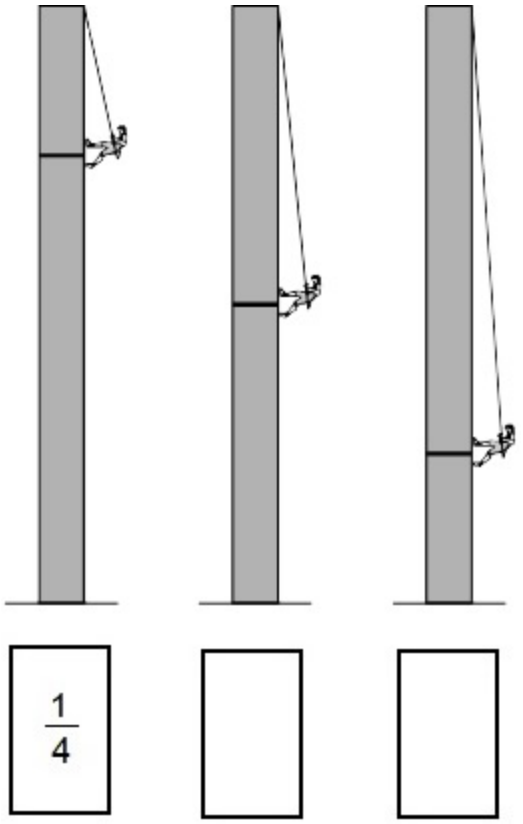
1 mark

17. **Climbing**

Some people are climbing down walls. The diagram shows their positions.

(a) Write a fraction in each box to show about how far **down** the wall each person is.

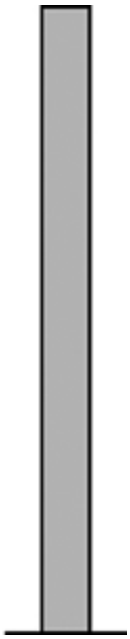
The first one is done for you.



2 marks

(b) A different person is about $\frac{1}{3}$ of the way **down** the wall.

Draw a line on the wall to show the person's position.



1 mark

18. **Thinking fractions**

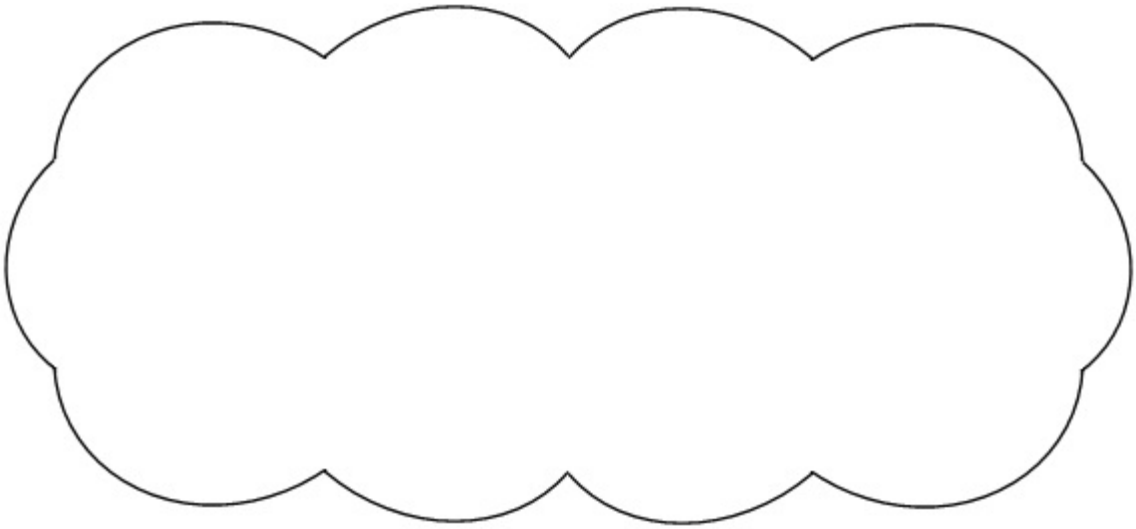
(a) Sam wrote the calculation:

$$\frac{1}{4} + \frac{1}{4} = \frac{2}{8}$$

Is he correct?

Yes ☐ No ☐

Explain your answer.



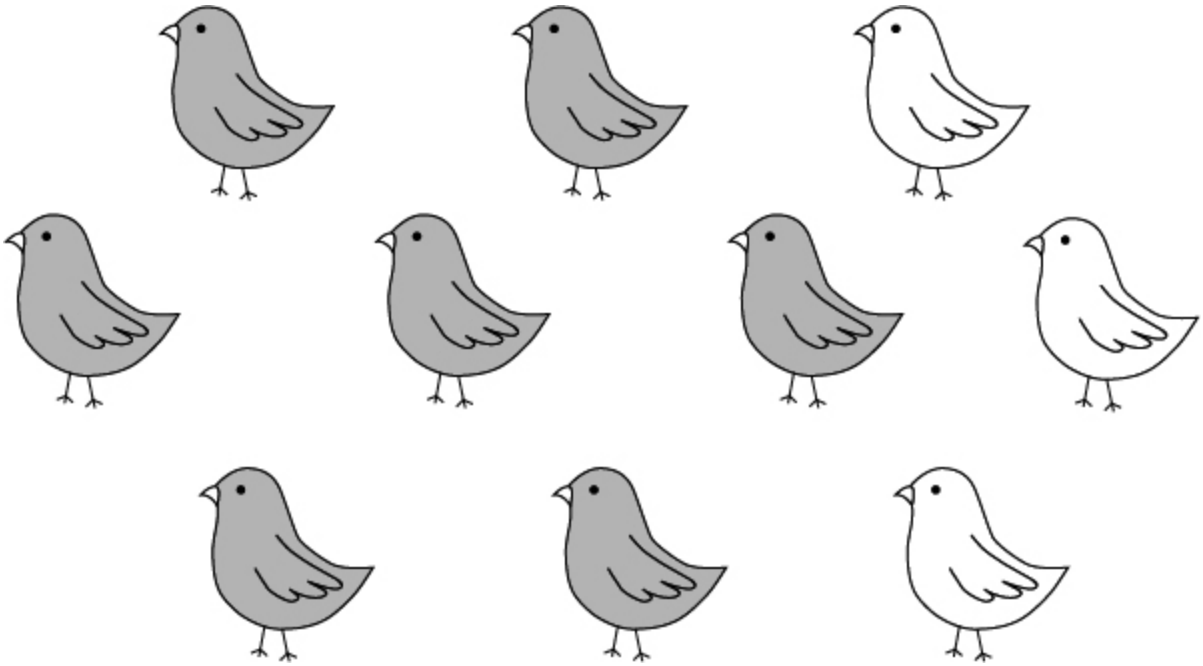
1 mark

(b) Think about the fraction $\frac{1}{5}$

How many of them add to make 1?

1 mark

19. What fraction of these birds is **grey**?



Write the fraction.

1 mark

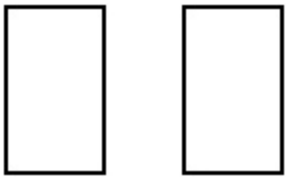
20. Look at these numbers.

5	$7\frac{1}{2}$	9	$12\frac{1}{2}$	17	$22\frac{1}{2}$

(a) Which two of these numbers **add up to 20**?

1 mark

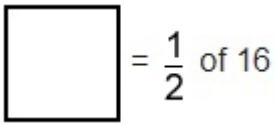
(b) Which two of these numbers have a **difference of 10**?



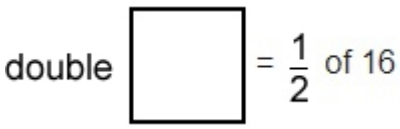
1 mark

21. **Fractions**

Write the missing numbers.



1 mark



1 mark

22. Place these numbers in order of size, starting with the **smallest.**

0.87	0.7	0.078	0.807
smallest			**largest**

1 mark

Place these fractions in order of size, starting with the **smallest.**

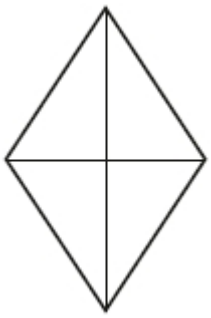
$\frac{1}{2}$ $\frac{3}{4}$ $\frac{5}{6}$ $\frac{7}{12}$

smallest **largest**

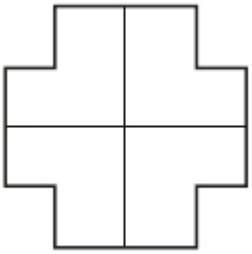
1 mark

23. Shade the fractions of the shapes.

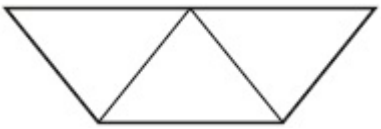
Shade $\frac{3}{4}$



Shade $\frac{1}{2}$



Shade $\frac{2}{3}$



2 marks

24. Tom ate half a cookie.

Which fraction shows the amount he ate?

Circle it.

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

1 mark

25.

small bottle of water

500 ml

large bottle

$2\frac{1}{2}$ litres

How many small bottles of water will fill the large bottle?

small bottles

1 mark

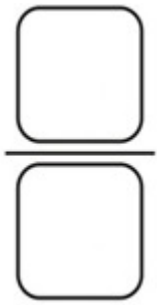
26. Write the two missing values to make these equivalent fractions correct.

$$\frac{\square}{5} = \frac{6}{10} = \frac{12}{\square}$$

2 marks

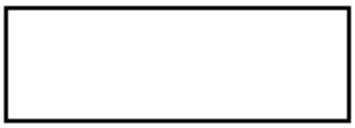
27. Here are some number cards.

(a) Use **two** of the cards to make a fraction which is **more than** $\frac{1}{2}$ **but less than 1**



1 mark

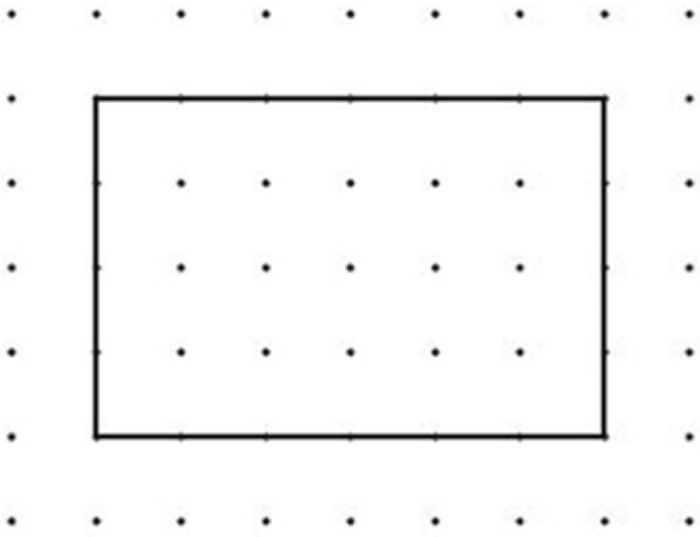
(b) How much **less than 1** is your fraction?



1 mark

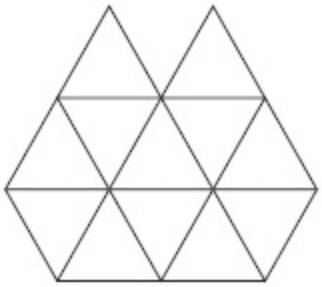
28. Draw lines to divide the rectangle into eight equal parts.

Use the dots to help you.



1 mark

29. Shade $\frac{3}{4}$ of this shape.



1 mark

30. Boris cuts a cake into 8 equal pieces.

Boris eats $\frac{4}{8}$ and Simon eats $\frac{3}{8}$ of the cake.

What fraction of the cake is left?

1 mark

31. Draw an arrow (↓) on the number line to show $1\frac{1}{4}$

1 mark

32. Peter has a box that contains 5 chocolate cupcakes and 3 vanilla cupcakes.

(a) What fraction of the cupcakes in the box are vanilla?

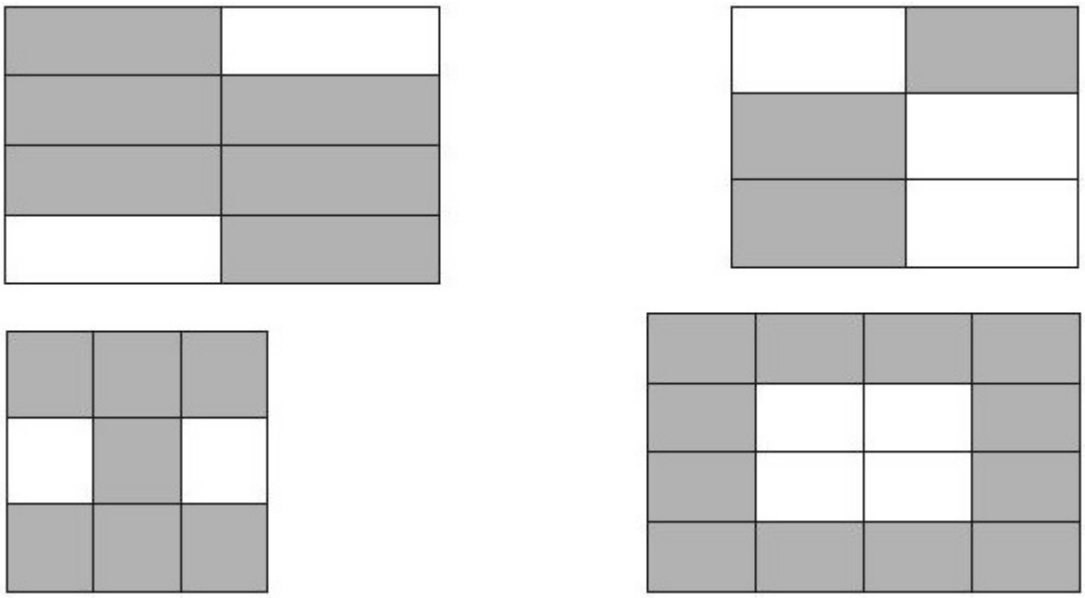
1 mark

(b) Peter adds one chocolate cupcake and one vanilla cupcake to the box.

What fraction of the cupcakes in the box are vanilla now?

1 mark

33. Tick the shape that has $\frac{1}{2}$ shaded.



1 mark

34. Write these numbers in order starting with the smallest.

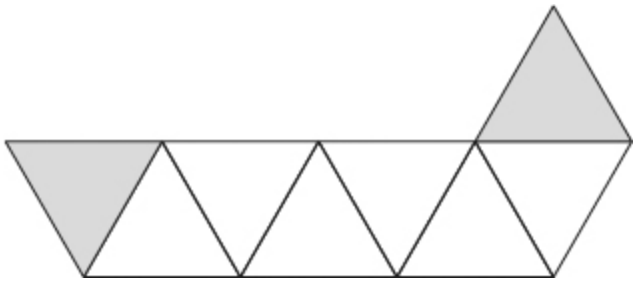
$\frac{1}{3}$ $\frac{1}{8}$ $\frac{1}{2}$ $\frac{1}{4}$

smallest largest

1 mark

35. Sarah wants to shade $\frac{3}{4}$ of this shape.

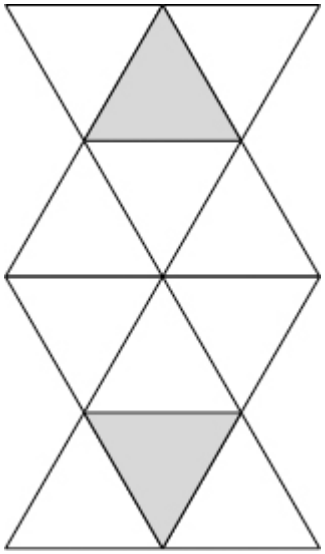
She has shaded **2** triangles.



How many **more** triangles must she shade so that $\frac{3}{4}$ is shaded?

1 mark

36. Here is a shape made from matching triangles.



Circle the fraction of the shape that is shaded.

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$

1 mark

37. Mr Barker takes his class to a museum.

They enter the dinosaur display at 12:45pm.

They leave at 1:30pm.

How long do they spend at the dinosaur display.
Circle the correct answer.

$\frac{1}{4}$ hour

$\frac{1}{2}$ hour

$\frac{3}{4}$ hour

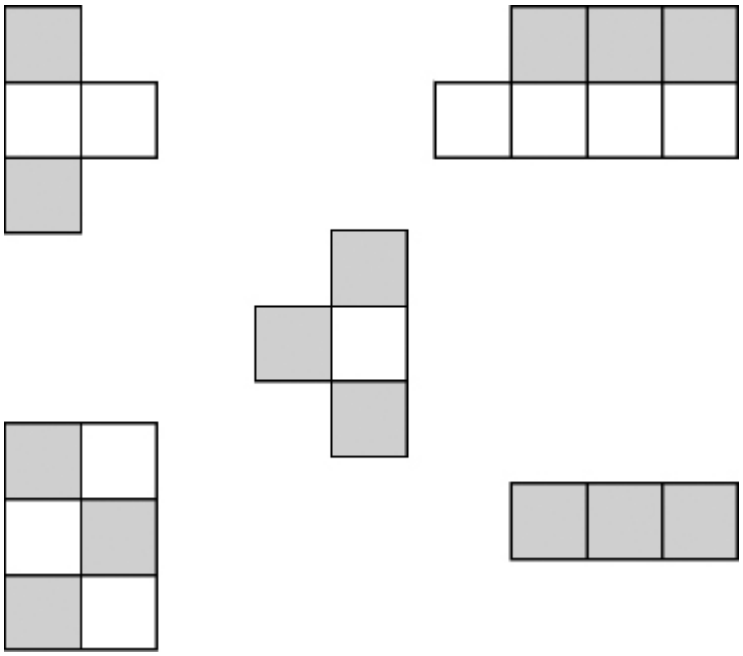
1 hour

more than 1 hour

1 mark

38. Here are some shapes.

Tick (✓) the shape that has $\frac{3}{4}$ shaded.



1 mark

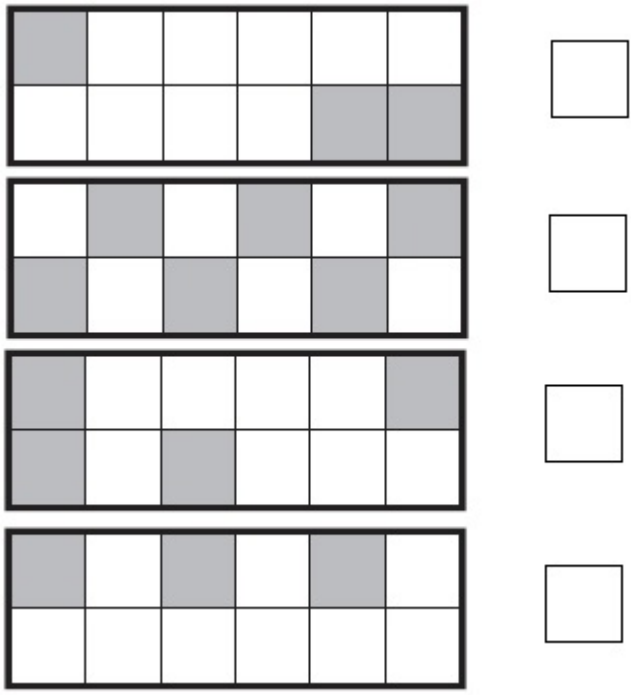
39. Sarah has a bag of 24 marbles.

$\frac{1}{3}$ of the marbles are red.

How many marbles are red?

1 mark

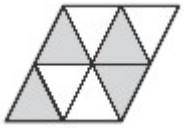
40. Tick (✓) the shape that is exactly $\frac{1}{3}$ shaded.



1 mark

Mark schemes

1. Colours 4 complete triangles, eg:



Accept any other clear way of indicating the correct number of triangles, eg ticking.
Accept part-triangles shaded, provided the shaded parts of the triangles are equivalent to 4 whole triangles.
***Do not** award the mark if more than 4 whole triangles are shaded in total.*

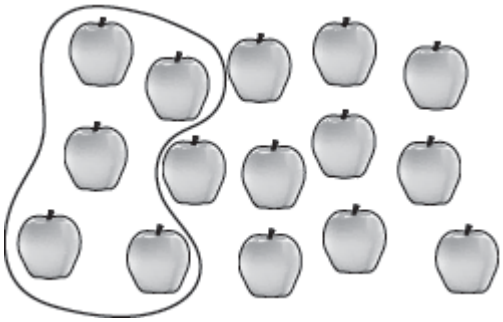
[1]

2. $\frac{1}{4}$ **or** one-quarter

Accept two-eighths, or equivalent fractions, in numbers or words.

[1]

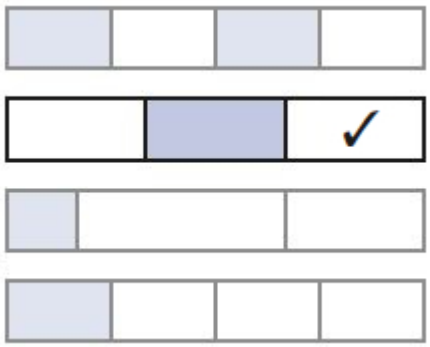
3.



Accept any other clear indication of 5 apples being selected.

[1]

4. Correct shape ticked as shown:



Accept any other clear way of indicating the correct shape.
***Do not** award the mark if additional shapes are indicated, unless it is clear that the correct shape is the pupil's final choice.*

[1]

5. (a) Gives a correct explanation

Accept imprecise use of language

In this context, accept, eg

- *It's* $\frac{2}{16}$ *so half it*

The most common correct explanations:

Use ratio, eg

There are 7 times as many white as grey squares

Do not accept incorrect statement, eg

- *You only count squares if there is more than half shaded, so it's 2 out of 16*

Show understanding of fractions, eg

- It's half of a quarter

Accept minimally acceptable explanation for understanding of fractions, eg

- *4 squares is a quarter; 2 squares is one eighth*
- *There are 4 rows. Half of one row is shaded, that makes one eighth*

Use spatial methods, eg

- Move the triangle under, then there are 8 equal parts

- If two squares stand for one unit, there are 8 units altogether. The two shaded bits fit together to make 1 unit, so it's 1 out of 8

Refer to both 2 and 16, eg

- There are 16 squares 2 are shaded an $\frac{2}{16} = \frac{1}{8}$
- There are 2 shaded triangles. Altogether, there would be 16 triangles so it's 2 out of 16
- 2 are shaded and 2 is $\frac{1}{8}$ of 16

Accept minimally acceptable explanation for referring to both 2 and 16, eg

- *16 squares, 2 are shaded*
- *It's* $\frac{2}{16}$

Do not accept incomplete explanation that does not interpret the 8, eg

- *2 squares shaded so it's* $\frac{1}{8}$
- *The 2 squares make one and it's 1 out of 8*

1

(b) $\frac{3}{8}$ or equivalent fraction

! Decimal fraction

Accept only if exact, ie 0.375

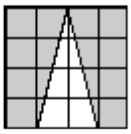
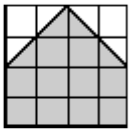
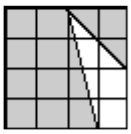
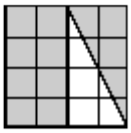
! Incorrect cancelling

If a correct fraction is seen, ignore further incorrect working, eg accept

- $\frac{6}{16} = \frac{3}{9}$

1

(c) Shades $\frac{3}{4}$ using 2 lines, both of which start at P, eg

- 
- 
- 
- 

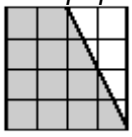
Accept lines not ruled

Do not accept no shading

Do not accept other than 2 straight lines used, eg

! Two adjacent regions shaded

Accept provided both lines start at P, eg



1

[3]

6. 3 (bags)

Accept 3 bags indicated on the image as long as it is clear that this is the pupil's final intended answer.

[1]

7. 18

1

33

1

36

1

[3]

8. 12

[1]

9. Award **TWO** marks for all fractions correctly identified as shown:

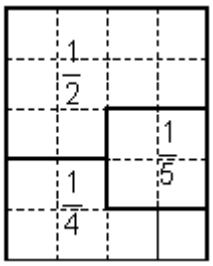
a. ⅓
b. ⅕
c. ⅙
d. ¼
e. ½

If incorrect, award **ONE** mark for any three or four correct answers.

Up to 2m

[2]

11. Draws a correct diagram, and labels at least 3 of the 4 parts correctly, eg

- 

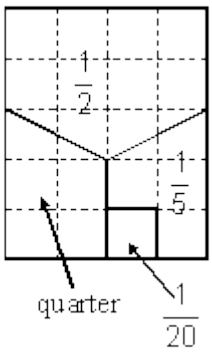
Note:

$\frac{1}{2}$ is 10 squares,

$\frac{1}{4}$ is 5 squares

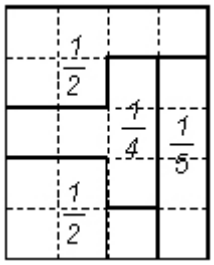
$\frac{1}{5}$ is 4 squares, and

$\frac{1}{20}$ is 1 square

- 

! ***Drawing not accurate***
Accept provided the pupil's intention is clear

! ***One or more of the parts subdivided***
eg



2

or Any two parts correct and labelled

or

All four parts correct but no labelling or labels incorrect
If it is clear which parts are which, mark as 1, 0

1

[2]

12. (a) $\frac{3}{4}$

1

(b) $\frac{1}{2}$

Accept equivalent fractions or decimals

! ***Equivalent percentages***
Penalise only the first occurrence

Do not accept incorrect notation
eg, for part (b)

- $\frac{2.5}{5}$
- $\frac{2\frac{1}{2}}{5}$

1

[2]

13. Indicates $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}, \frac{1}{4}, \frac{1}{4}$, in any order

[1]

14. Award **TWO** marks for two different fractions that are greater than $\frac{1}{2}$ but less than 1, eg

- $\frac{3}{4}$ and $\frac{2}{3}$ or equivalent fractions

Do not accept for 2m, two fractions that are equivalent, eg

- $\frac{3}{4}$ *and* $\frac{6}{8}$

*Award **ONE** mark for one fraction that is greater than* $\frac{1}{2}$ *but less than 1 even if the other is incorrect, a duplicate or omitted*

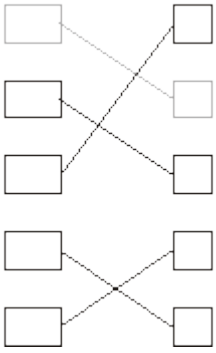
***Do not** accept for 2m or 1m, incorrect notation for fractions, eg*

- $\frac{0.4}{0.6}$ *and* $\frac{\frac{1}{2}}{\frac{2}{3}}$

Up to 2

[2]

15. (a) Matches all four calculations correctly, ie



! ***Calculation matched to more than one fraction***
For 2m or 1m, do not accept as a correct match

2

or *Matches at least two calculations correctly*

1

(b) $\frac{5}{6}$ or equivalent

! ***Decimal value rounded***
Accept 0.83 or better

1

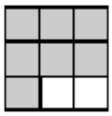
[3]

16. (a) $\frac{7}{9}$ or equivalent fraction

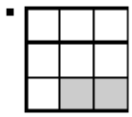
! Answer given as a decimal
If a correct fraction is seen, ignore subsequent conversion to a decimal even if incorrect
If only a decimal is given, accept 0.78 or 0.77(...)
Do not accept 0.8 unless a more accurate value is seen

1

(b) Indicates the correct squares, ie



Do not accept incorrect shading, eg



1

[2]

17. (a) Indicates ½ or equivalent fraction

Accept value between 0.4 and 0.6 inclusive, even if given as a decimal or percentage

Indicates 3/4 or equivalent fraction

Accept value between 0.65 and 0.85 inclusive, even if given as a decimal or percentage, eg

$\frac{2}{3}$

1

(b) Indicates the position of the climber within the tolerance as shown by the overlay
Accept any unambiguous indication

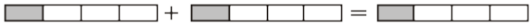
! Accuracy difficult to judge, eg
Climber drawn, but no line
Line not horizontal
In drawings of the climber with no line, take as their indication the mid-point of the climber 's feet. Otherwise, do not accept if their indication extends beyond the tolerance as shown by the overlay

1

[3]

18. (a) Indicates No and gives a correct explanation
The most common correct explanations:

Show or imply the correct sum, eg

- $\frac{1}{4} + \frac{1}{4} = \frac{2}{8} + \frac{2}{8} = \frac{4}{8}$
- $\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$, but $\frac{2}{8} = \frac{1}{4}$
- 0.25 + 0.25 = 0.5 and 0.5 = $\frac{4}{8}$
- 

Accept minimally acceptable explanation, eg

- $\frac{4}{8}$
- $\frac{2}{4}$
- $\frac{1}{2}$
- *Half*

Give a correct and comparable calculation that gives $\frac{2}{8}$, eg

- $\frac{1}{4} + 0 = \frac{2}{8}$
- $\frac{1}{4} = \frac{2}{8}$ so you can't add another $\frac{1}{4}$
- $\frac{1}{8} + \frac{1}{8} = \frac{2}{8}$

Accept minimally acceptable explanation, eg

- $\frac{1}{4} = \frac{2}{8}$

Address the misconception, eg

- Sam has just added the top numbers together and the bottom numbers together and you can't add fractions like that
- You don't need to change the bottom number, just add the top ones together

Accept minimally acceptable explanation, eg

- *He added the top and bottom numbers together*
- *You only add the top numbers [denominator unchanged implied]*
- *You don't add the bottom numbers [numerators added implied]*

Do not accept incomplete explanation, eg

- *You add the numerators*
- *You keep the denominator the same*

U1

(b) Indicates 5

Answer repeats fifths
Condone

eg, accept
- $\frac{5}{5}$
- $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$

The stated $\frac{1}{5}$ not included
Accept provided it is clear that it is not included

eg, accept
- *4 more*
- *An extra* $\frac{4}{5}$

eg, do not accept
- *4*

1

[2]

19. $\frac{7}{10}$

Accept equivalent fractions, e.g. 0.7, seven-tenths (please note: this question is intended to assess the identification of the correct fraction, rather than use of correct notation).

[1]

20. (a) Indicates 7 $\frac{1}{2}$ and 12 $\frac{1}{2}$, in either order

1

(b) Indicates 12 $\frac{1}{2}$ and 22 $\frac{1}{2}$, in either order

Accept equivalent fractions or decimals

1

[2]

21. 8

Do not accept: incomplete processing
eg, for the first mark

- *5 + 3*

1

4

For the second mark, follow through
Accept follow through as their value for the first mark ÷ 2

1

[2]

22. (a) 0.078 | 0.7 | 0.807 | 0.87

All four numbers in their correct places.

1

(b) 1/2 | 7/12 | 3/4 | 5/6

All four numbers in their correct places.

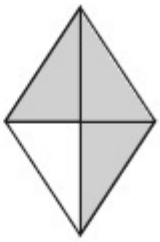
Accept $\frac{6}{12}$ $\frac{7}{12}$ $\frac{9}{12}$ $\frac{10}{12}$

1

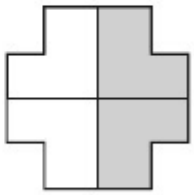
[2]

23. Award **TWO** marks for all shapes correctly shaded, e.g.

Shade $\frac{3}{4}$



Shade $\frac{1}{2}$



Shade $\frac{2}{3}$

Award **ONE** mark for any **two** shapes correctly shaded.
Accept any other clear way of indicating the correct fractions; e.g. marking the appropriate number of sections.

[2]

24. Correct fraction circled as shown:

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

Accept any other clear way of indicating the correct answer.
***Do not** award the mark if additional fractions are indicated, unless it is clear the correct fraction is the pupil's final choice.*
***Do not** accept alternative equivalent values written, e.g. the word 'half'.*

[1]

25. 5 (small bottles)

[1]

26. $\frac{3}{5} = \frac{6}{10} = \frac{12}{20}$

[2]

27. (a) $\frac{5}{7}$ OR $\frac{5}{9}$ OR $\frac{3}{5}$ OR $\frac{9}{11}$ OR $\frac{7}{9}$ OR $\frac{7}{11}$

Accept only fraction formed by the cards given.

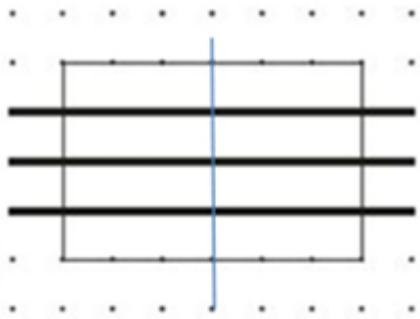
1

(b) $\frac{2}{7}$ OR $\frac{4}{9}$ OR $\frac{2}{5}$ OR $\frac{2}{11}$ OR $\frac{2}{9}$ OR $\frac{4}{11}$

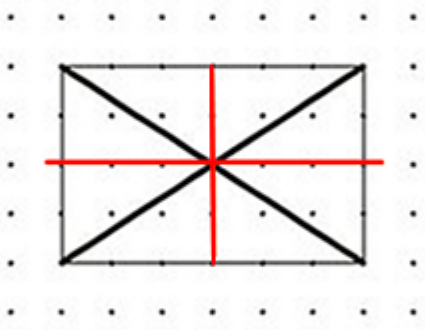
1

[2]

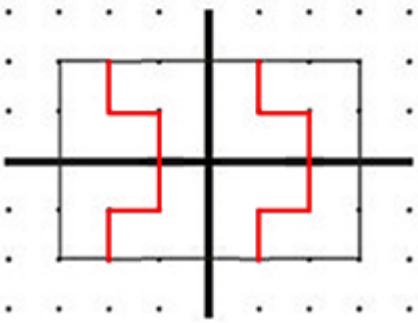
28. Rectangle divided into eight equal parts, e.g.



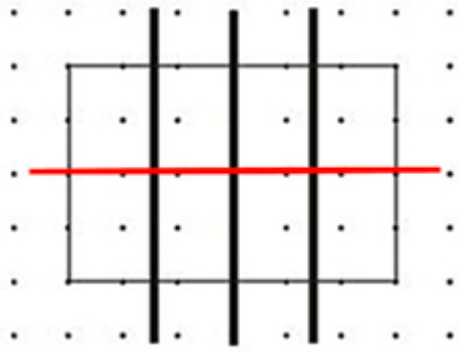
OR



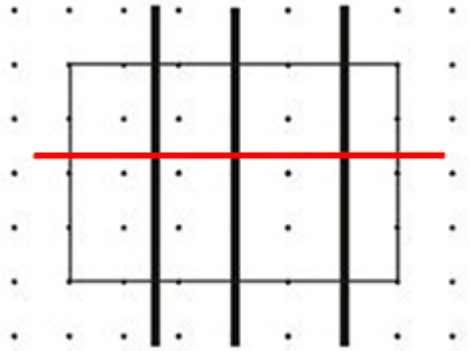
OR



Accept slight inaccuracies in drawing lines provided the intention is clear.
Accept divisions that do not use dots, provided the lines drawn are reasonably accurate, and the pupil's intention is clear, e.g.



Do not *award the mark if the rectangle is divided into four unequal parts, e.g.*



[1]

29. Diagram completed to show three triangles shaded, or equivalent, eg

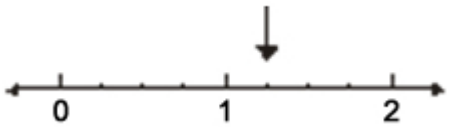
Accept inaccurate shading provided the intention is clear.

[1]

30. $\frac{1}{8}$

[1]

31. An arrow drawn on the number line as shown:



Accept any other clear way of indicating $1\frac{1}{4}$ *on the number line as long as the intention is clear.*
Accept slight inaccuracies, provided the intention is clear.

[1]

32. (a) $\frac{3}{8}$

Accept equivalent fractions or decimals.

1

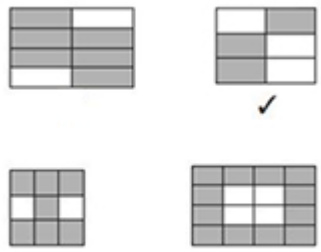
(b) $\frac{4}{10}$ OR $\frac{2}{5}$

Accept equivalent fractions or decimals.

1

[2]

33. Both shapes ticked as shown:



Accept alternative unambiguous positive indications, e.g. shape circled.

[1]

34. $\frac{1}{8}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

[1]

35. 4

Do not *accept four triangles shaded without 4 written in the answer box.*

[1]

36. One answer circled as shown:

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$

Accept any other clear way of indicating the correct number, such as ticking or underlining.

[1]

37. One answer circled as shown:

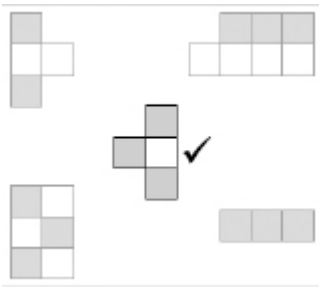
$\frac{1}{4}$ hour $\frac{1}{2}$ hour $\frac{3}{4}$ **hour**

1 hour more than 1 hour

Accept any other clear way of indicating the correct answer, such as ticking or underlining.

[1]

38. One shape ticked as shown:



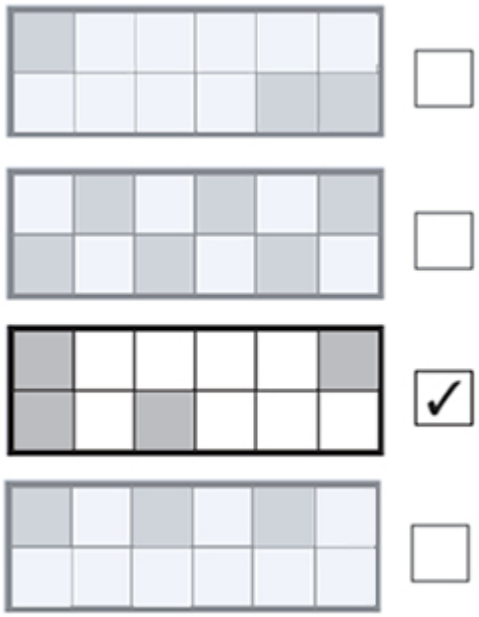
Accept any other clear way of indicating the correct shape, such as circling.

[1]

39. 8

[1]

40. Diagram ticked correctly as shown:



Accept alternative unambiguous indications.

[1]