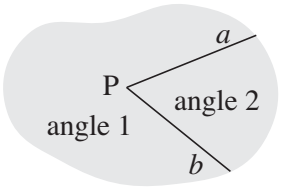
1

Imagine that this shape continues in any direction without ending, so it represents a **plane**. The **rays** *a* and *b* are drawn from the same starting point, P.



We call the two parts of the plane **angles**.
We call the measure of them an angle too.

Mark in *red* the angle which is greater than the other.

2

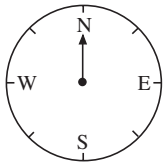
Draw these angles. (r.a. means ' right angle')

$\alpha = 2$ r. a. $\quad \beta = \frac{1}{2}$ r. a. $\quad \gamma = 1.5$ r. a. $\quad \delta = 3$ r. a. $\quad \varepsilon = 3.5$ r. a.

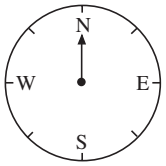
_____ _____ _____ _____ _____

3

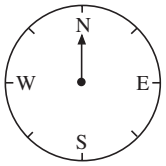
Start at the compass direction North and draw the rotations asked for.

a) 

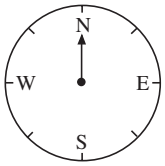
3 right angles clockwise

b) 

2 right angles anti-clockwise

c) 

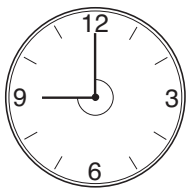
half a right angle clockwise

d) 

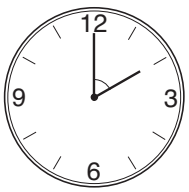
3 and a half right angles anti-clockwise

4

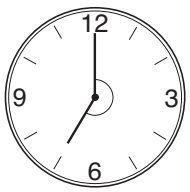
Write down the angle formed by the arms of the clock in right angles.

a) 

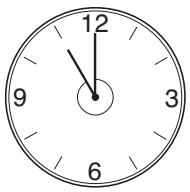
.....

b) 

.....

c) 

.....

d) 

.....

5

In your exercise book, draw a quadrilateral (if it is possible) which has:

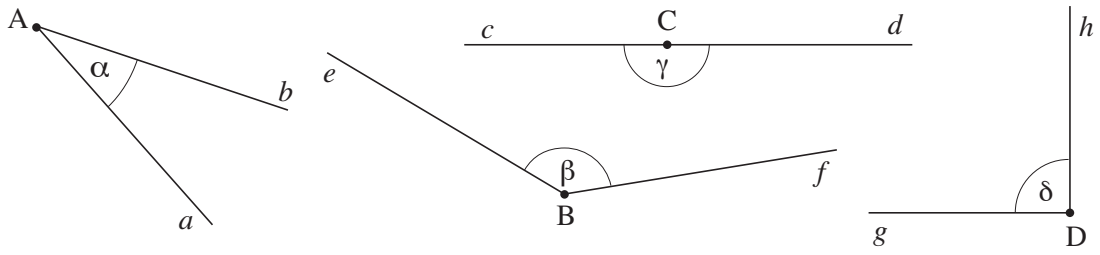
a) only one right angle

b) two adjacent right angles and two angles which are **not** right angles

c) exactly 3 right angles

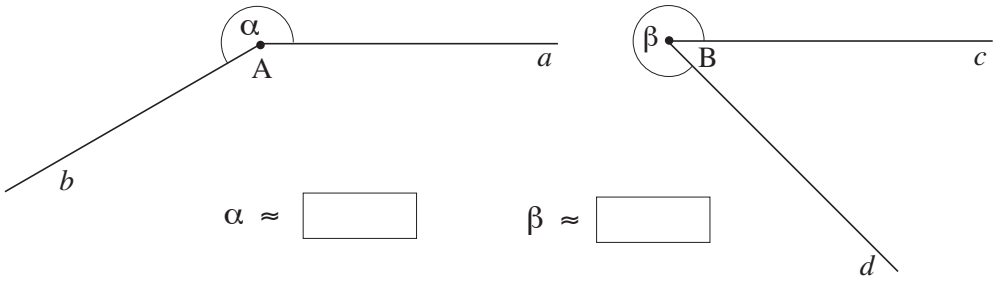
d) 4 right angles.

1 Measure these angles using a **protractor** and write their sizes in the boxes.



α ≈ ☐ β ≈ ☐ γ = ☐ δ = ☐

2 Measure these angles with a protractor and write their sizes in the boxes.

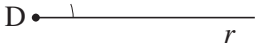


α ≈ ☐ β ≈ ☐

3 Use a ruler and protractor to draw the given angles.

a) 60° b) 20° c) 55°

d) 110° e) 240° f) 340°

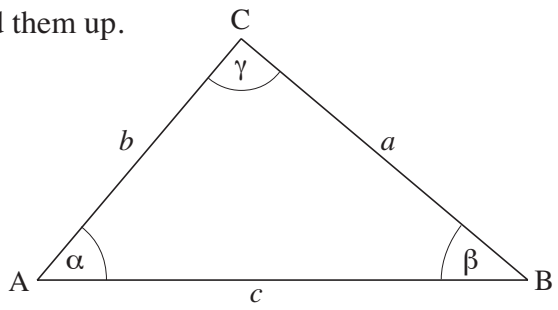


4 Measure the angles of the triangle and add them up.

α ≈ ☐ β ≈ ☐

γ ≈ ☐

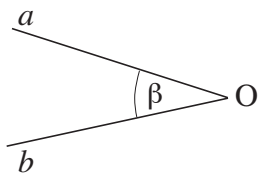
α + β + γ ≈ ☐



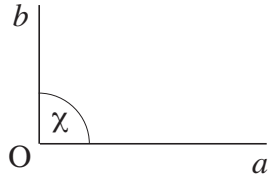
1 Write the name of the type of angle in the box, then measure the angle.

a) 

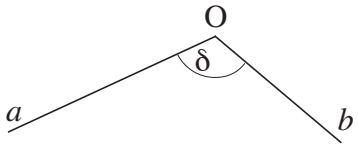
[ ] angle α = [ ] °

b) 

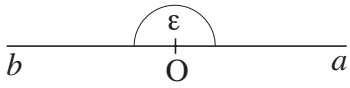
[ ] angle β = [ ] °

c) 

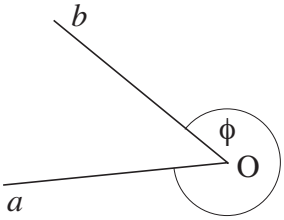
[ ] angle χ = [ ] °

d) 

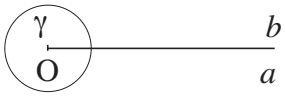
[ ] angle δ = [ ] °

e) 

[ ] angle ε = [ ] °

f) 

[ ] angle ϕ = [ ] °

g) 

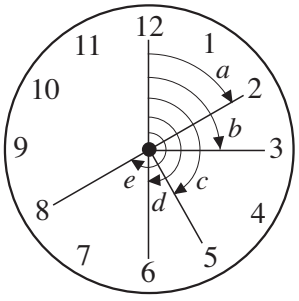
[ ] angle γ = [ ] °

2 Measure or calculate the angles marked on the clock.

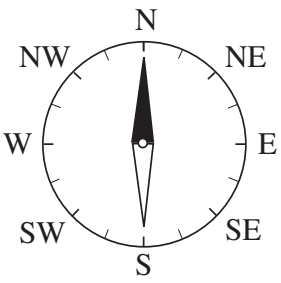
$\angle a$ = [ ] $\angle b$ = [ ]

$\angle c$ = [ ] $\angle d$ = [ ]

$\angle e$ = [ ]



3 Measure or calculate the angles between the given compass directions.



a) N and NE [ ] b) N and E [ ]

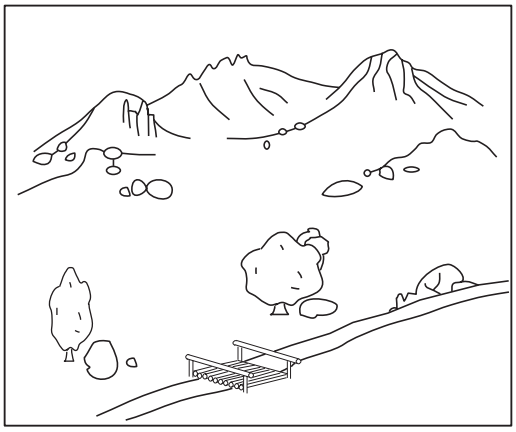
c) N and SE [ ] d) N and SW [ ]

e) NE and SE [ ] f) E and NW [ ]

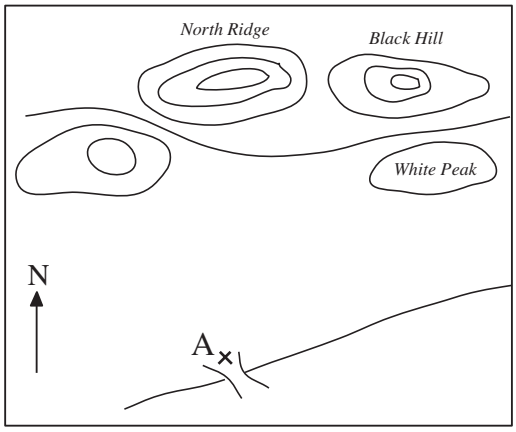
g) W and SSW [ ] h) E and NNE [ ]

1 Here is a sketch of some mountain peaks and the corresponding map.

Sketch



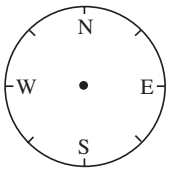
Map



a) You are at the bridge (A) and want to walk to *White Peak*.

On the map, draw and measure the **angle** at point A between North and your planned direction of travel.

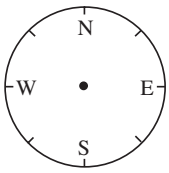
Write the angle and draw it on the compass diagram.



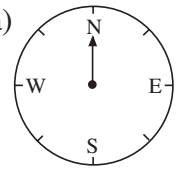
b) You have reached the top of *White Peak* and want to continue to *North Ridge*.

Measure the angle, in a **clockwise** direction, between North and your next planned direction of travel.

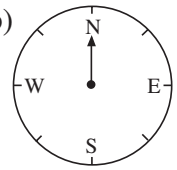
Write the angle and draw it on the compass diagram.



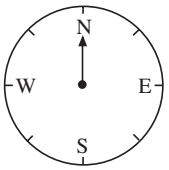
2 Draw turns from North by the given angles. Write the new compass directions below.

a) 

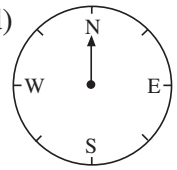
+ 90°

b) 

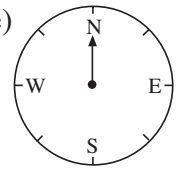
– 135°

c) 

– 45°

d) 

+ 225°

e) 

– 270°

3 a) How many degrees is the angle between:

i) N and NE ii) NNE and ENE?

b) If a ship sails NNE and then turns to the right by 90°, in which compass direction is the ship travelling now?

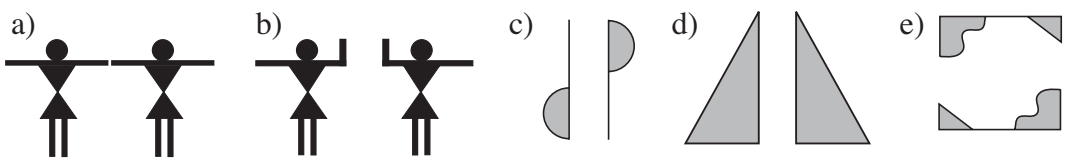
c) If we are facing ESE and turn to the right by 45°, in which direction are we facing now?

4 In your exercise book, write the angle made by the minute hand of a clock as it moves:

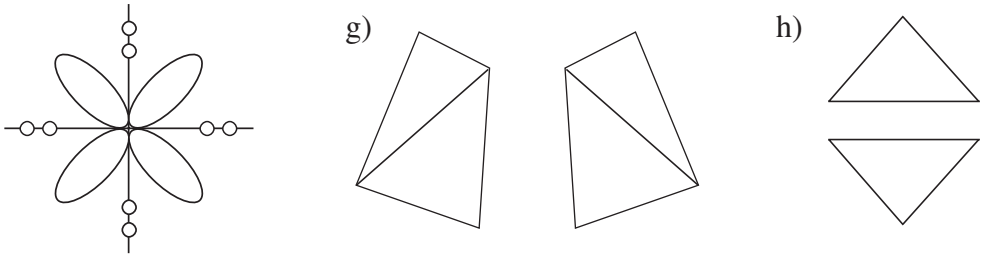
a) 5 minutes b) 10 minutes c) 20 minutes d) 45 minutes e) 1 minute.

1 If the diagram has **line symmetry**, draw the lines of symmetry in *red*. If the diagram has **rotational symmetry**, mark the centre of rotation in *green*.

a) b) c) d) e)

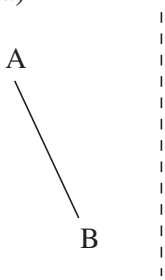


f) g) h)

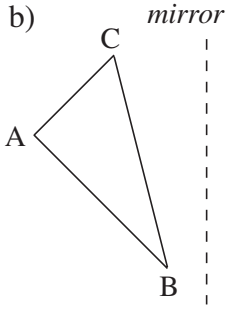


2 **Reflect** the shape in the mirror line. Label the corresponding points A', B', etc.

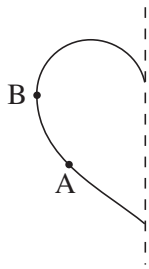
a) *mirror line*



b) *mirror line*

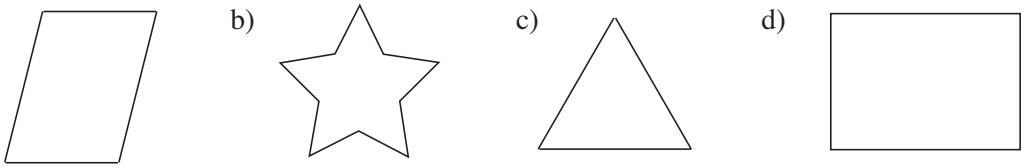


c) *mirror line*

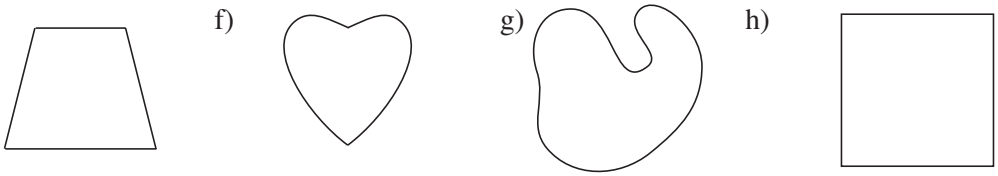


3 If the shape has line symmetry, draw the lines of symmetry. If the shape has rotational symmetry, mark the centre of rotation and label it C.

a) b) c) d)

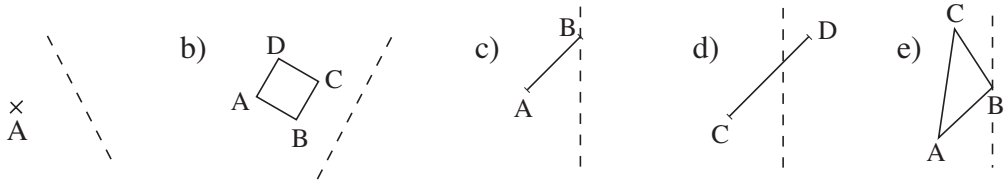


e) f) g) h)

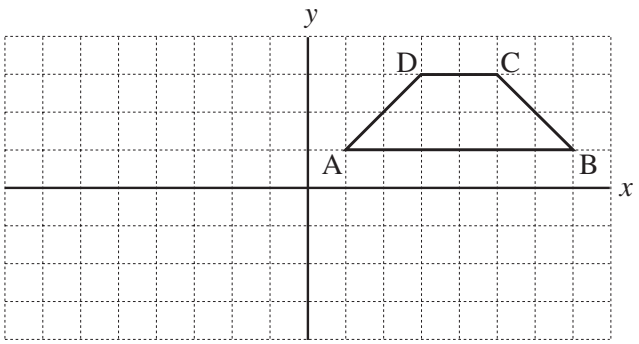


4 Draw the **mirror image** of each shape and label the corresponding points.

a) b) c) d) e)



1 Reflect quadrilateral ABCD in the *x*-axis, then reflect its image in the *y*-axis.



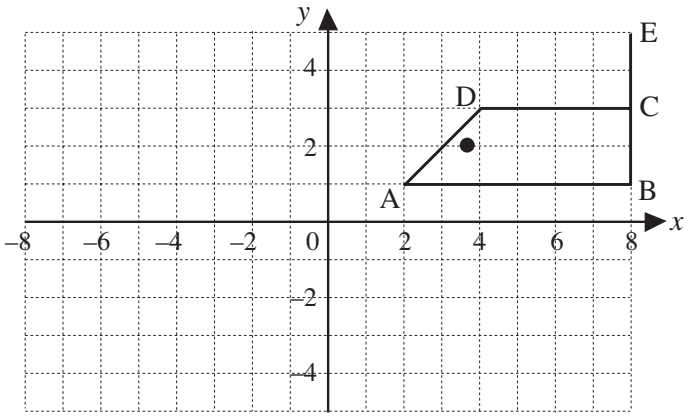
Fill in the missing signs.

AB	☐	A'B'	☐	A"B"
CD	☐	C'D'	☐	C"D"
BC	☐	B'C'	☐	B"C"
DA	☐	D'A'	☐	D"A"

2 a) Reflect the mouse in the *y*-axis. Label the image of point A with A', etc.

b) Reflect the original mouse in the *x*-axis. Label the image of A with A*, etc.

c) Reflect the image in a) in the *x*-axis. Label the image of A' with A", etc.



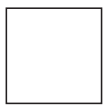
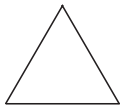
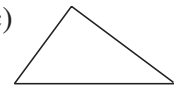
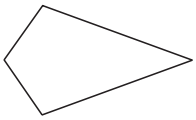
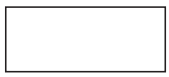
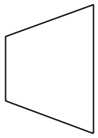
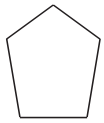
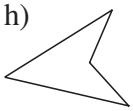
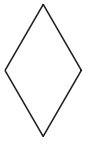
A (2,1) B (,) C (,)
D (,) E (,)

A' (,) B' (,) C' (,)
D' (,) E' (,)

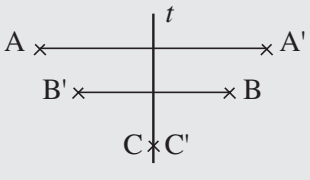
A* (,) B* (,) C* (,)
D* (,) E* (,)

A" (,) B" (,) C" (,)
D" (,) E" (,)

3 Draw lines of symmetry on the polygons.

a) 
b) 
c) 
d) 
e) 
f) 
g) 
h) 
i) 

4



Imagine that the whole plane is reflected in *mirror line t*. Are these statements true or false? Write T or F.

a) Each half plane determined by *t* is a reflection of the other. ☐

b) Every point in the plane has just 1 image point. ☐

c) The image of any line is also a line. ☐

d) The image of a point on the *mirror line* is the point itself. ☐

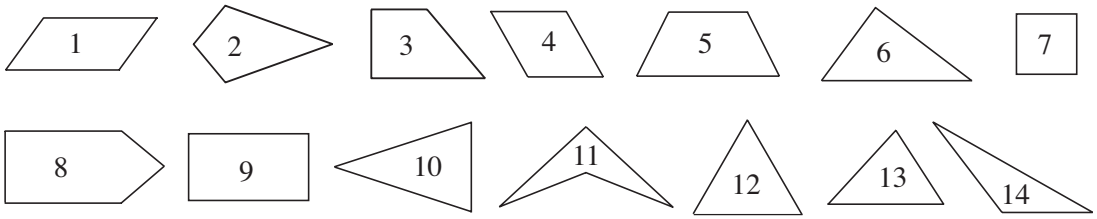
e) The image of a line perpendicular to the *mirror line* is the line itself. ☐

f) The length of a line segment is greater than the length of its image. ☐

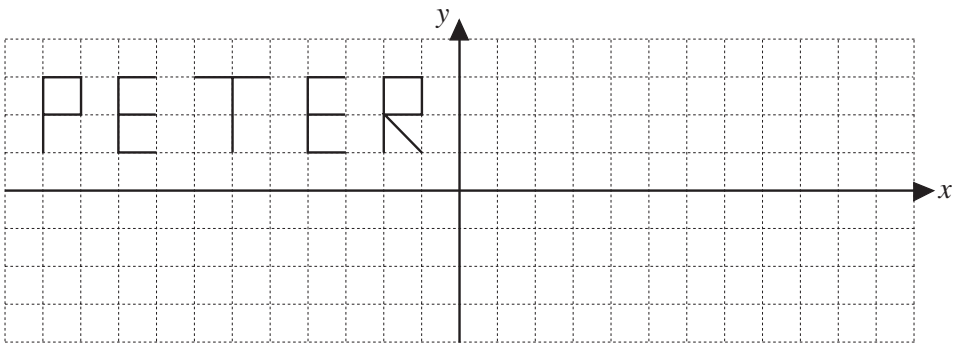
g) The size of any angle is equal to the size of its image. ☐

h) The midpoint between any point A and its image A' lies on the *mirror line*. ☐

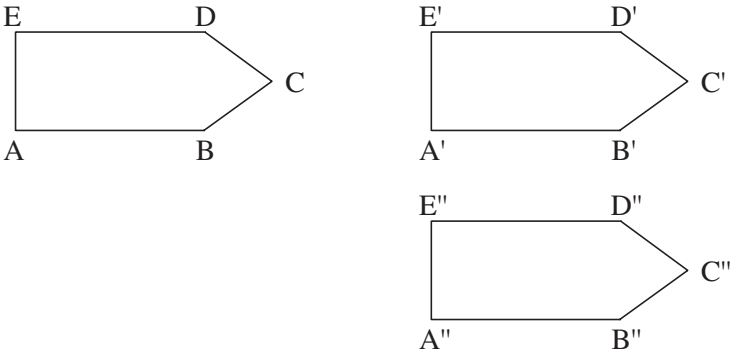
1 Which of these shapes is symmetrical? Draw the lines of symmetry.



2 **Reflect** the word PETER: a) in the x-axis b) in the y-axis.



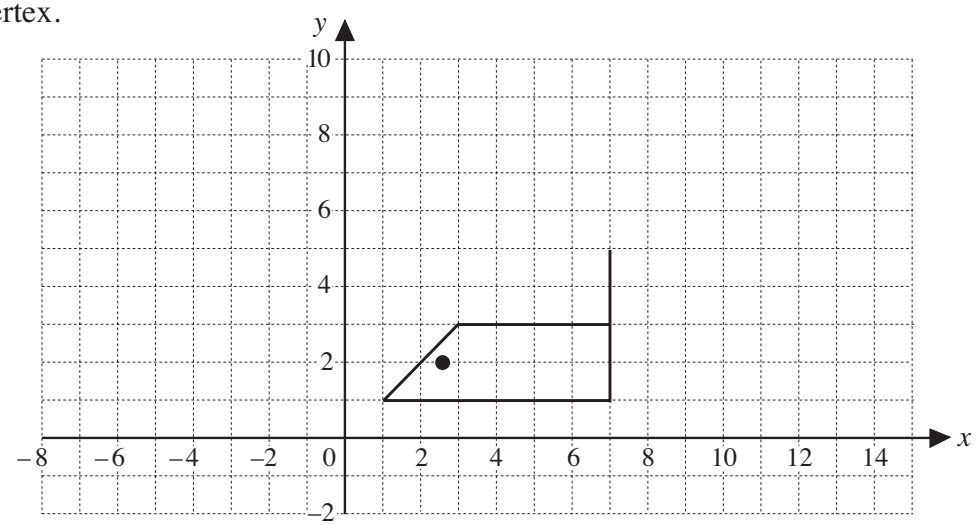
3 Two translations were done one after the other. Replace them with just one translation. Draw arrows between the corresponding points on the diagram (e.g. A → A")



Measure the distance of each translation and write it below the arrow.

How much shorter is your translation than the sum of the two given?

4 **Translate** the mouse by adding 7 to the first coordinate and 3 to the second coordinate of each vertex.

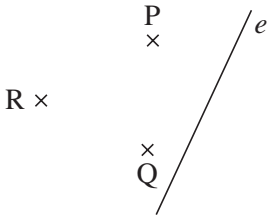


1

a) Reflect the points P, Q and R in line *e*.

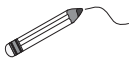
b) Draw the triangles PQR and P'Q'R'.

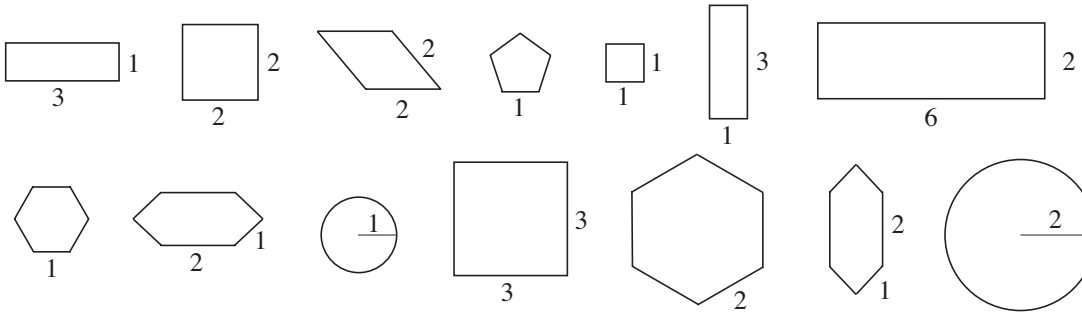
c) Measure the angles in each triangle and add them up.



2

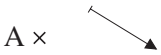
Join up **congruent** shapes in *red* and **similar** but not congruent shapes in *blue*.

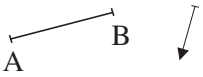


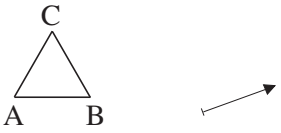


3

Translate the shape according to the given **vector** (arrow).

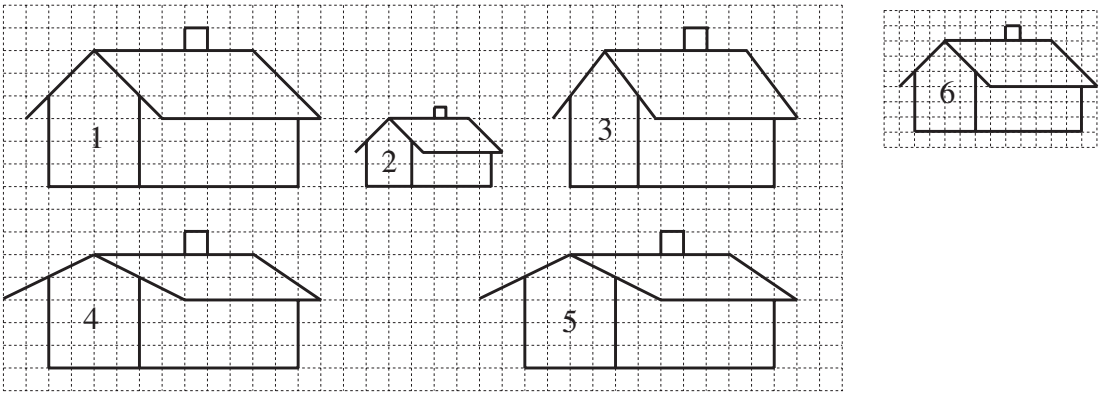
a) 

b) 

c) 

4

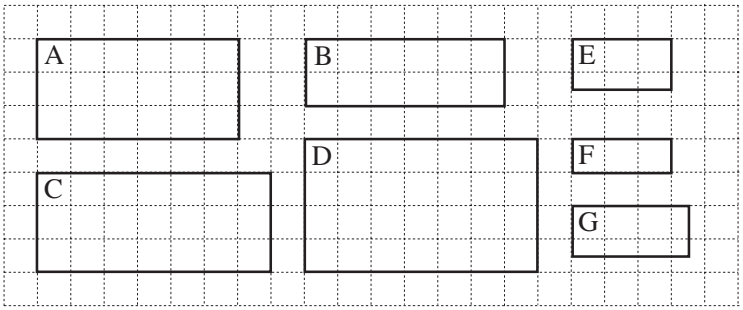
List the houses which are **similar** to one another.



5

In your exercise book, list **similar** pairs of shapes.

Write the ratio of enlargement or reduction beside each pair.



1

a) **Enlarge** the square in the ratio of:

i) 2:1 ii) 3:1.

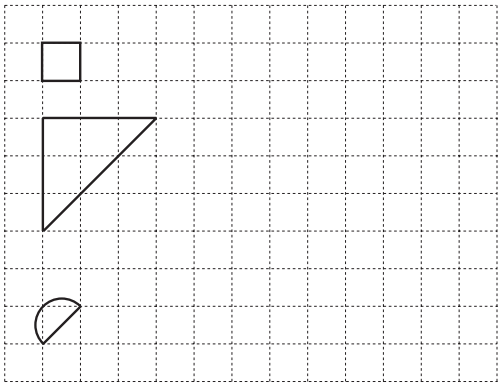
Write the area inside each square.

b) **Reduce** the triangle in the ratio of

i) 2:3 ii) 1:3.

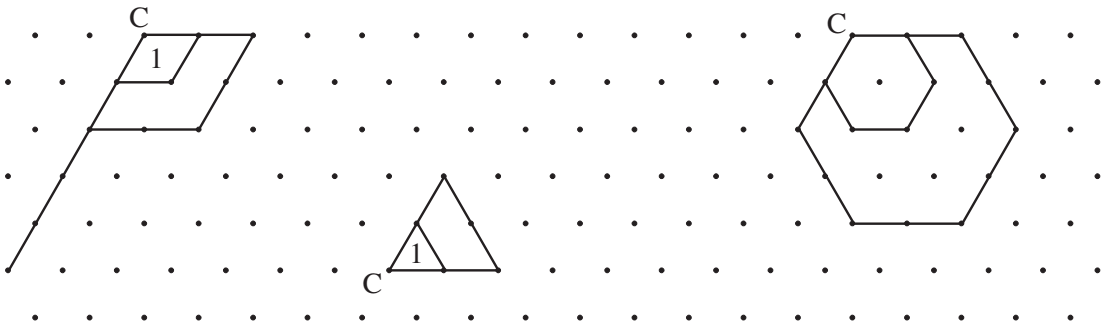
c) **Enlarge** the semicircle in the ratio of:

i) 2:1 ii) 3:1.



2

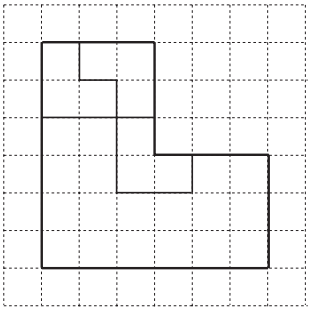
Continue enlarging the rhombus, the triangle and the regular hexagon.
Write their areas as sequences in your exercise book.



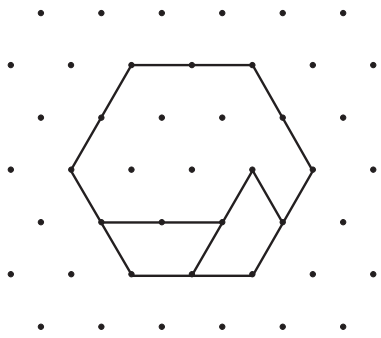
3

Continue dividing the large shape into **congruent** (equal) parts.

a)

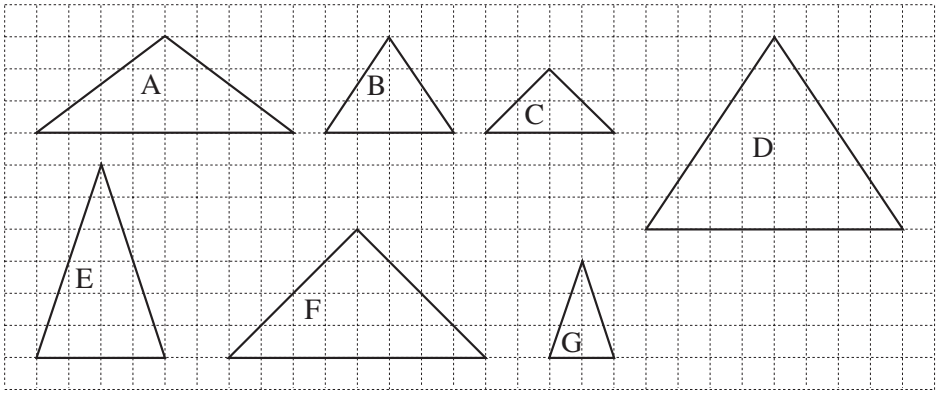


b)



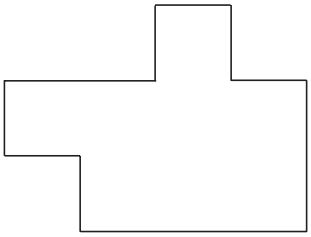
4

Colour **similar** triangles in the same colour. Calculate their areas in your exercise book.



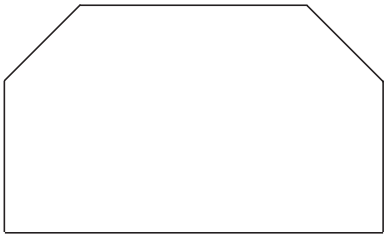
1 In your exercise book, calculate the **real** area of the gardens shown in these plans.

a)



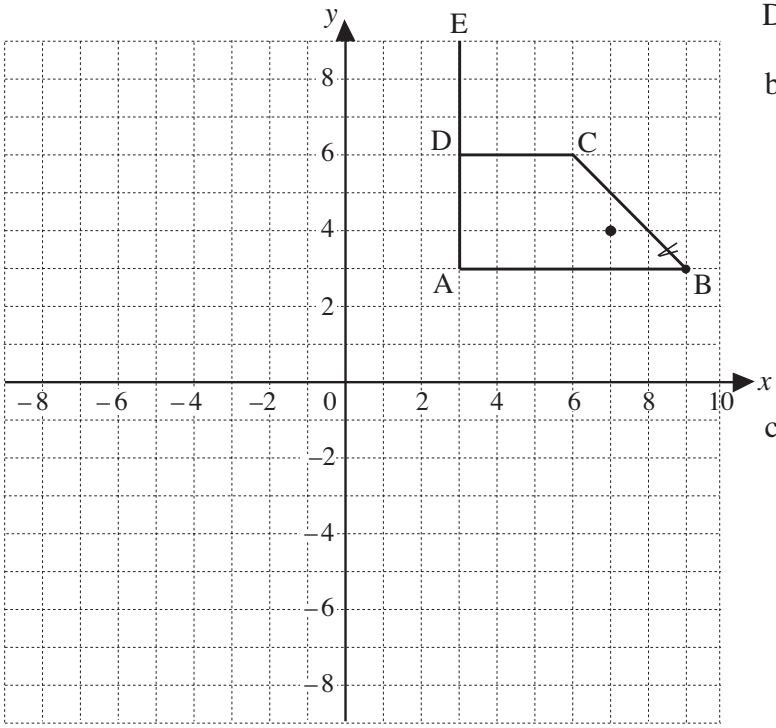
Scale 1 : 1000

b)



Scale 1 : 2000

2 a) Fill in the coordinates of the points. A (,), B (,), C (,), D (,), E (,)



b) Divide the coordinates of each point by 3.

A' (,), B' (,), C' (,), D' (,), E' (,)

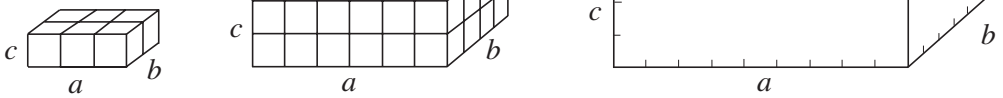
Draw the new shape.

c) Change each of the original coordinates to its **opposite** number.

A'' (,), B'' (,), C'' (,), D'' (,), E'' (,)

Draw the new shape.

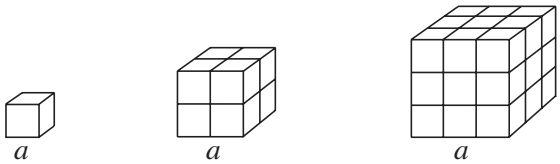
3 a) Complete the drawing of the third cuboid.



a = 3, 6, . . . b = 2, 4, . . . c = 1, 2, . . . A = 22, . . . V = 6, . . .

Continue the sequences for sides a, b and c and for area (A) and volume (V) in your exercise book.

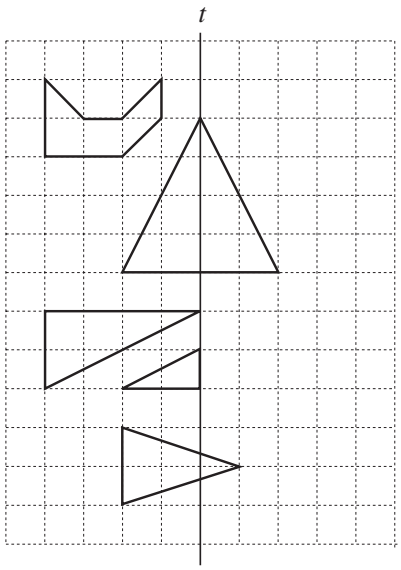
b) Continue the sequences for a, A and V in your exercise book.



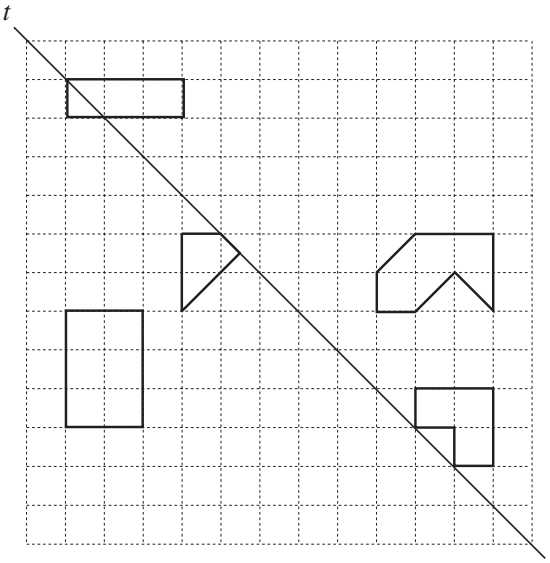
a = 1, 2, 3, . . . A = 6, 24, . . . V = 1, 8, . . .

1 **Reflect** the shapes in axis t.

a)

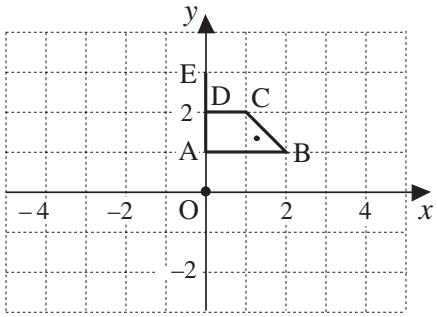


b)



2 a) Write the coordinates of the shape.

A (,), B (,), C (,),
D (,), E (,)



b) Rotate the shape by $-90°$ around point O.
Write the new coordinates.

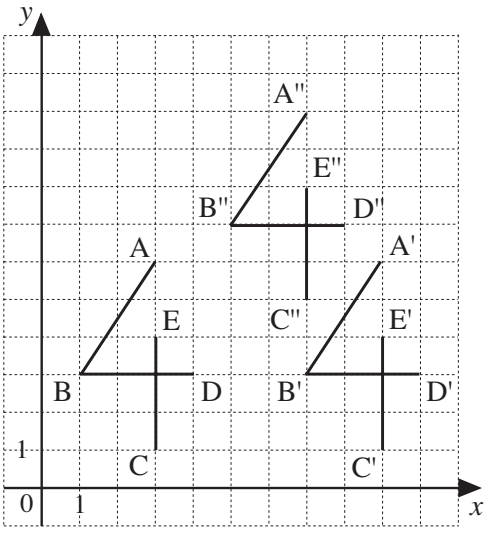
A' (,), B' (,), C' (,),
D' (,), E' (,)

c) Repeat the rotation with the image. Write the new coordinates.

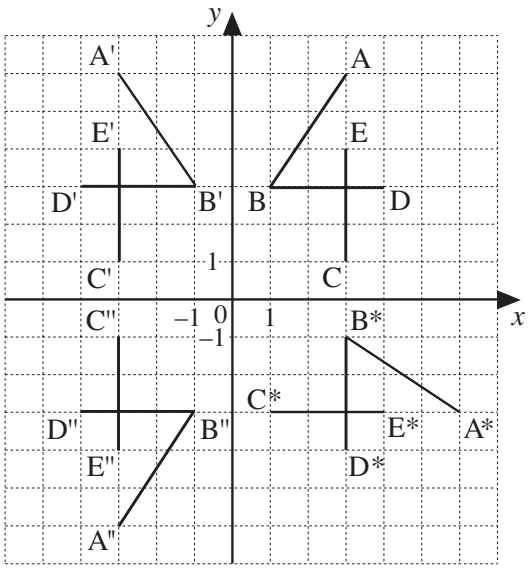
A'' (,), B'' (,), C'' (,), D'' (,), E'' (,)

3 Write the coordinates of the points in the original diagram and in its images in your exercise book. What kind of transformations have been done?

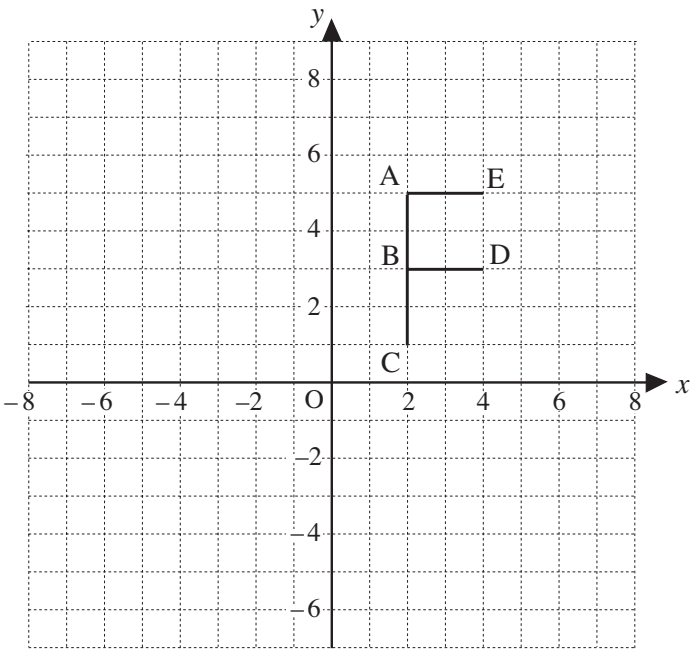
a)



b)



1



a) **Translate** shape F so that the coordinates of point C' are (5, 2).

b) **Reflect** the original shape F in the x-axis.

c) **Rotate** the original shape F by 90° around point O.

d) **Rotate** the original shape F by 180° around point O.

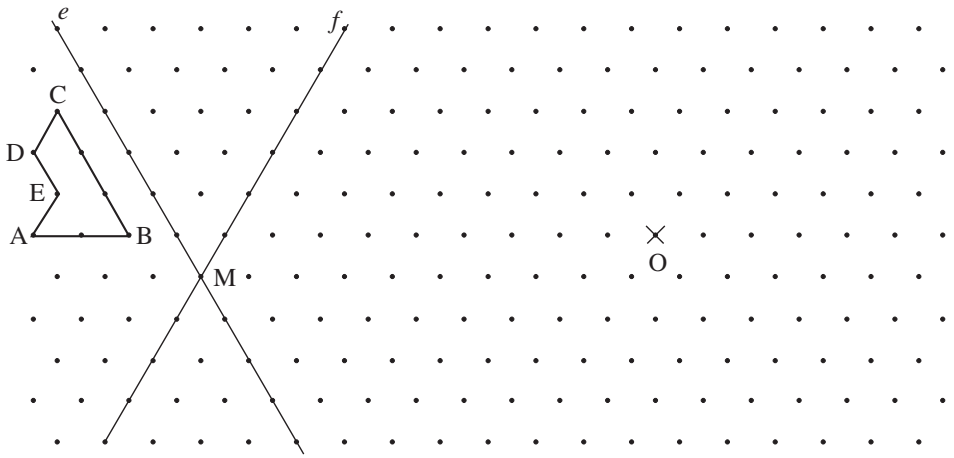
2

a) **Reflect** shape ABCDE in line e.

b) **Reflect** its image in line f.

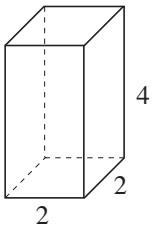
c) **Translate** the image 4 units to the right.

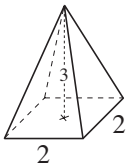
d) **Rotate** the last shape by $-60°$ around point O. Repeat the rotation several times.

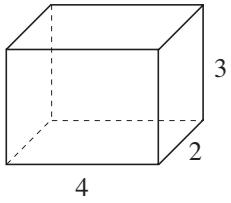


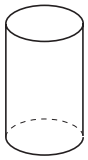
3

a) Write beside each solid how many planes of symmetry it has.

i) 

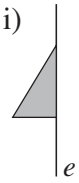
ii) 

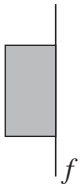
iii) 

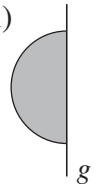
iv) 

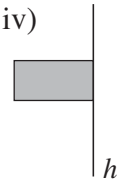
b) Which type of solid is formed by rotating each of the shaded shapes around the given axis?

Write the names in your exercise book.

i) 

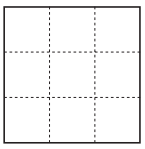
ii) 

iii) 

iv) 

1

1 unit

a) 

If this square is 1 unit,
what part of the unit is each grid square? ☐

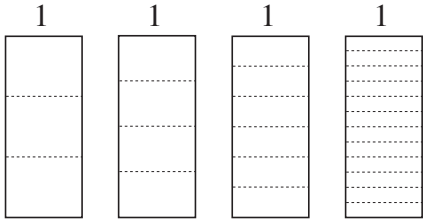
b) Compare the fractions. Fill in the missing signs. (<, >, =)

i) $\frac{1}{9}$ ☐ $\frac{2}{9}$ ii) $\frac{3}{9}$ ☐ $\frac{5}{9}$ iii) $\frac{6}{9}$ ☐ $\frac{3}{9}$ iv) $\frac{4}{9}$ ☐ $\frac{2}{9}$

v) $\frac{9}{9}$ ☐ $\frac{7}{9}$ vi) $\frac{4}{9}$ ☐ $\frac{7}{9}$ vii) $\frac{8}{9}$ ☐ $\frac{9}{9}$ viii) $\frac{11}{9}$ ☐ $\frac{15}{9}$

2

Each rectangle is 1 unit.



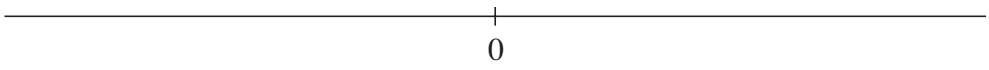
a) Colour *red* one part of each of the rectangles. Write below it what fraction the *red* part is of the whole unit.

b) List the fractions in decreasing order.

. . . . . .

3

$\frac{3}{4}$, ☐; $-\frac{1}{2}$, ☐; $\frac{4}{4}$, ☐; $-\frac{5}{4}$ ☐



a) Write beside each fraction its **opposite** value.

b) Use your ruler to measure and draw appropriate ticks on the number line, then mark on it and label all the eight fractions.

c) Write the fractions in increasing order.

. . . . . .

4

Write these fractions in increasing order.

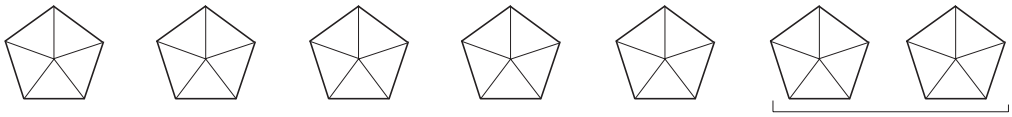
a) $\frac{8}{12}, -\frac{1}{12}, -\frac{12}{12}, \frac{5}{12}, -\frac{13}{12}, \frac{14}{12}, -\frac{18}{12}$

. . . . . .

b) $-\frac{3}{2}, \frac{3}{8}, \frac{3}{5}, \frac{3}{2}, -\frac{3}{4}, -\frac{3}{12}, \frac{3}{7}, -\frac{3}{6}$

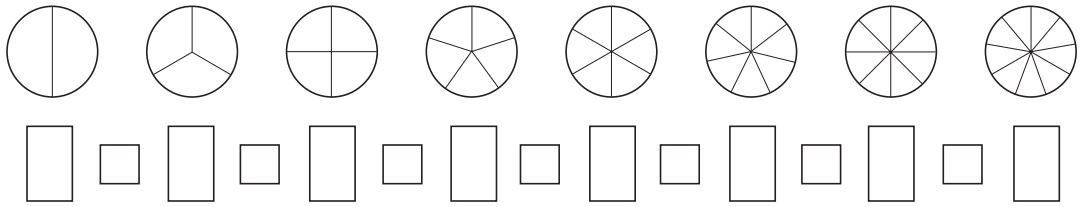
. . . . . .

1 Each pentagon is 1 unit. Colour the given fractions and compare them. (<, > or =)



$\frac{1}{5}$ ☐ $\frac{2}{5}$ ☐ $\frac{3}{5}$ ☐ $\frac{4}{5}$ ☐ $\frac{5}{5}$ ☐ $\frac{7}{5}$

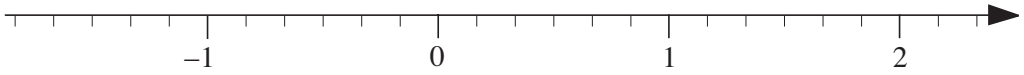
2 Each circle is 1 unit. Colour **two** parts in each circle.



Write the fractions coloured below the circles and compare them. (<, > or =)

3 a) Mark these fractions and their **opposite** values on the number line.

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



b) List all the marked fractions in increasing order.

. . . . . .

4 Fill in the missing numbers.

a) $\frac{1}{2} + \square = 1$ $\frac{1}{3} + \square = 1$ $\frac{2}{3} + \square = 1$ $\frac{3}{3} + \square = 1$

$\frac{3}{7} + \square = 1$ $\square + \frac{2}{9} = 1$ $\frac{4}{5} + \square = 1$ $\frac{4}{5} + \square = 2$

b) $1 - \frac{2}{2} = \square$ $1 - \frac{1}{2} = \square$ $1 - \frac{0}{2} = \square$ $1 - \frac{3}{4} = \square$

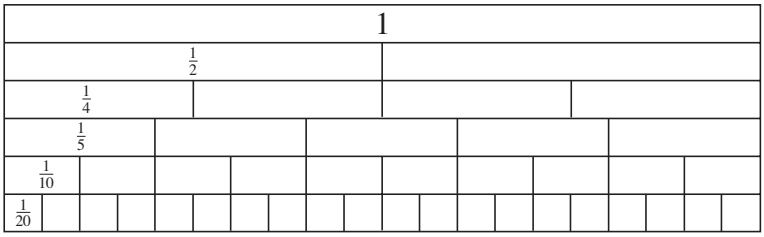
$2 - \frac{4}{5} = \square$ $1 - \frac{3}{7} = \square$ $2 - \frac{6}{6} = \square$ $3 - \frac{2}{5} = \square$

5 Compare the fractions. Fill in the missing signs. (<, > or =)

a) $\frac{2}{15} \square \frac{7}{15}$ b) $\frac{6}{7} \square \frac{1}{7}$ c) $-\frac{2}{8} \square -\frac{3}{8}$ d) $\frac{51}{10} \square \frac{52}{10}$

e) $\frac{4}{8} \square \frac{4}{10}$ f) $\frac{3}{2} \square \frac{3}{4}$ g) $-\frac{1}{3} \square -\frac{1}{2}$ h) $\frac{40}{50} \square \frac{40}{100}$

1 Write different forms of the same quantities from the diagram.



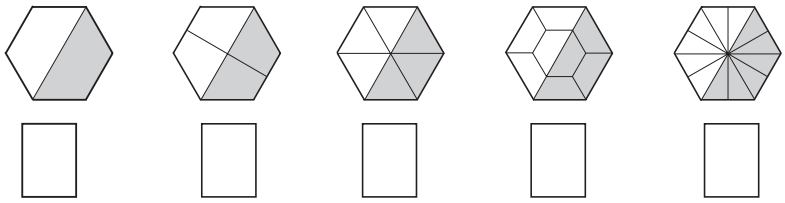
$1 = \frac{2}{2} = \frac{\ }{4} = \frac{\ }{5} = \frac{\ }{10} = \frac{\ }{20}$ $\quad \frac{1}{2} =$ $\quad \frac{1}{4} =$

$\frac{3}{4} =$ $\quad \frac{1}{5} =$ $\quad \frac{2}{5} =$ $\quad \frac{3}{5} =$

$\frac{4}{5} =$ $\quad \frac{1}{10} =$ $\quad \frac{3}{10} =$ $\quad \frac{7}{10} =$ $\quad \frac{9}{10} =$

2 Each hexagon is 1 unit.

Which form of the fraction shaded do they each show?



3 Write each of these fractions in at least 5 different forms.

a) $\frac{2}{3} =$

b) $\frac{4}{7} =$

c) $\frac{0}{6} =$

d) $\frac{11}{11} =$

4 a) **Simplify** these fractions.

i) $\frac{6}{10} =$ $\quad$ ii) $\frac{24}{72} =$ $\quad$ iii) $\frac{4}{8} =$

iv) $\frac{15}{45} =$ $\quad$ v) $\frac{8}{5} =$ $\quad$ vi) $\frac{8}{4} =$

b) Compare the fractions and write them in increasing order.

. . . . . .

1 List the numbers marked on the number line in increasing order and continue the sequence.

. . . . . .

2 Fill in the missing numerators and denominators. Write other forms of the numbers.

a) $\frac{3}{4} = \frac{6}{8} = \frac{\square}{12} = \frac{\square}{16} = \frac{15}{\square} = \frac{\square}{\square} =$

b) $\frac{6}{5} = \frac{12}{\square} = \frac{\square}{20} = \frac{18}{\square} = 1 + \frac{\square}{5} = 1\frac{\square}{5}$

c) $\frac{12}{3} = \frac{24}{\square} = \frac{\square}{9} = \frac{\square}{1} = \frac{4}{\square} = \frac{\square}{12} =$

3 Compare the fractions in each pair. Fill in the missing signs. (<, > or =)

a) $\frac{3}{4} \square \frac{5}{8}$ b) $\frac{4}{5} \square \frac{8}{10}$ c) $\frac{7}{9} \square \frac{2}{3}$ d) $\frac{23}{50} \square \frac{4}{10}$

e) $\frac{2}{3} \square \frac{5}{8}$ f) $\frac{1}{4} \square \frac{1}{5}$ g) $\frac{5}{6} \square \frac{7}{9}$ h) $\frac{40}{30} \square \frac{25}{20}$

4 a) Draw a line segment 12 cm long in your exercise book.

i) Colour 2 thirds of it in *red*. How long is the *red* part? ☐

ii) Colour 1 quarter of 2 thirds of the line segment in *blue*.
How long is the *blue* part? ☐

b) Draw another line segment 12 cm long in your exercise book.

i) Colour 1 quarter of it in *yellow*. How long is the *yellow* part? ☐

ii) Colour 2 thirds of 1 quarter of the line segment in *green*.
How long is the *green* part? ☐

5 How many centimetres are in:

a) 2 fifths of 10 metres ☐ b) 2 fifths of 1 metre? ☐

1 Put these numbers into three groups.

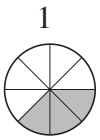
$$\frac{1}{8} \quad \frac{2}{4} \quad \frac{3}{2} \quad \frac{5}{8} \quad \frac{7}{2} \quad \frac{1}{2} \quad \frac{4}{4} \quad \frac{6}{6} \quad \frac{3}{8} \quad \frac{7}{9} \quad \frac{8}{8} \quad \frac{7}{6}$$

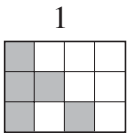
Less than 1: .....

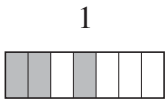
Equal to 1: .....

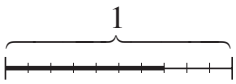
Greater than 1: .....

2 What part of each diagram is shaded? Write the fraction and show it as as an addition.

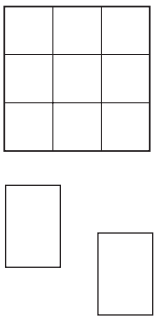
a) 

b) 

c) 

d) 

3 Andrew planted 2 ninths of his garden with strawberries and 5 ninths of his garden with gooseberries.



a) Shade the part used for strawberries in *red* and the part used for gooseberries in *green*.

b) What part of his garden did Andrew use to plant the fruit?

c) What part of his garden did he **not** use to plant the fruit?

4 a) In your exercise book, write each fraction as an addition so that one of the terms is a whole number and the other is a fraction.

Example $\frac{7}{3} = 1 + \frac{4}{3} = 2 + \frac{1}{3}$

i) $\frac{9}{7}$ ii) $\frac{16}{5}$ iii) $\frac{49}{22}$ iv) $\frac{13}{4}$

b) Write each sum as a single fraction. *Example* $2 + \frac{3}{5} = \frac{13}{5}$

i) $1 + \frac{1}{2}$ ii) $1 + \frac{2}{3}$ iii) $3 + \frac{1}{5}$ iv) $5 + \frac{2}{7}$ v) $3 + \frac{7}{4}$ vi) $6 + \frac{2}{9}$

5 a) $\frac{1}{4} + \frac{3}{4} + \frac{7}{4} + \frac{2}{4} =$

b) $\frac{7}{3} - \frac{2}{3} =$

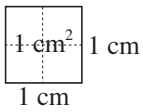
c) $\frac{9}{11} + \frac{3}{11} - \frac{1}{11} - \frac{5}{11} =$

d) $\frac{110}{50} - \frac{41}{50} + \frac{12}{50} =$

1

a) Draw a rectangle which has an area of 6 cm^2.

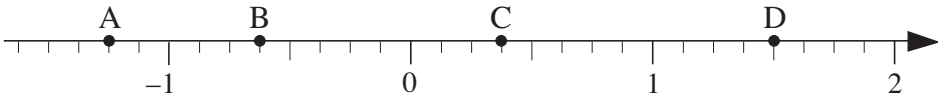
Colour $\frac{3}{4}$ of its area.



b) Draw a rectangle which has an area of $\frac{3}{4}$ cm^2.

2

a) Write the numbers below the dots marked on the number line.



b) Calculate:

i) A + B ☐ ii) B + C ☐ iii) A + C ☐

iv) B + D ☐ v) A + D ☐ vi) C + D ☐

c) How far is:

i) A from B ☐ ii) B from C ☐ iii) A from C ☐

iv) B from D ☐ v) A from D ☐ vi) C from D? ☐

3

Answer each question by writing an operation.

a) How much should we add to $\frac{3}{10}$ to get $\frac{8}{10}$? .....

b) How much more is $\frac{4}{11}$ than $\frac{1}{11}$? .....

c) How much should be added to 1 to get $\frac{7}{5}$? .....

d) How much more is $\frac{8}{5}$ than 1? .....

e) How much should be added to $\frac{6}{9}$ to get $\frac{11}{9}$? .....

4

a) $\frac{3}{6}+\frac{1}{6}+\frac{5}{6}+\frac{2}{6}=$ b) $1+\frac{3}{8}=$ c) $6+\frac{5}{9}=$

d) $\frac{4}{7}-\frac{3}{7}=$ e) $1-\frac{3}{8}=$ f) $6-\frac{5}{9}=$ g) $\frac{13}{9}-1=$

h) $\frac{3}{8}-1=$ i) $\frac{3}{10}+\frac{4}{10}-\frac{7}{10}-\frac{2}{10}=$ j) $\frac{2}{3}-\left(-\frac{2}{3}\right)=$

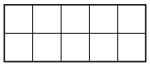
1 Do the calculations.

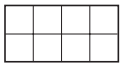
a) $\frac{1}{6}+\frac{1}{6}+\frac{1}{6}=$ b) $\frac{2}{5}+\frac{1}{5}=$ c) $\frac{5}{8}-\frac{2}{8}=$

d) $\frac{3}{7}+\frac{1}{7}+\frac{2}{7}=$ e) $\frac{8}{10}+\frac{3}{10}-\frac{5}{10}+\frac{2}{10}=$ f) $\frac{3}{9}-\frac{7}{9}=$

g) $1\frac{2}{3}+\frac{1}{3}=$ h) $2\frac{8}{9}-\frac{5}{9}=$ i) $4\frac{2}{3}-3\frac{1}{3}=$

2 Calculate the sums and differences. Use the diagrams to help you.

a) 1  i) $\frac{3}{5}+\frac{2}{10}=$ ii) $\frac{3}{5}-\frac{2}{10}=$ iii) $\frac{1}{2}+\frac{4}{10}-\frac{3}{5}=$

b) 1  i) $\frac{3}{8}+\frac{1}{4}=$ ii) $\frac{5}{8}-\frac{1}{2}=$ iii) $\frac{3}{8}+\frac{1}{2}-\frac{1}{4}=$

c) 1  i) $\frac{2}{9}+\frac{2}{3}=$ ii) $\frac{8}{9}-\frac{2}{3}=$ iii) $\frac{1}{9}+\frac{2}{3}-\frac{4}{9}=$

3 Calculate the sums and differences. Write details in your exercise book if necessary.

a) $\frac{2}{5}+\frac{3}{10}=$ b) $\frac{5}{12}+\frac{3}{4}=$ c) $\frac{1}{3}+\frac{2}{9}-\frac{3}{18}=$

d) $\frac{6}{2}+\frac{4}{10}+\frac{3}{5}=$ e) $\frac{3}{5}-\frac{4}{10}=$ f) $\frac{11}{12}-\frac{3}{4}=$

g) $\frac{3}{7}-\frac{2}{21}=$ h) $\frac{21}{12}-\frac{4}{3}=$ i) $1\frac{2}{3}-\frac{7}{6}=$

4 Start from 0 and draw these steps along the number line one after the other. Convert the fractions first. Where do you end up? Mark it and label it.

$\frac{3}{4}\square$, $-\frac{1}{2}\square$, $-\frac{1}{4}\square$, $\frac{3}{8}$, $\frac{2}{4}\square$, $-\frac{5}{8}$, $\frac{1}{2}\square$

5 Solve the equations. Draw suitable number lines in your exercise book if necessary.

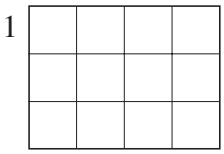
a) $\frac{1}{3}+a=\frac{3}{3}$ b) $\frac{3}{8}-b=\frac{1}{8}$ c) $\frac{7}{4}+c=\frac{11}{4}$

$a=\ldots\ldots$ $b=\ldots\ldots$ $c=\ldots\ldots$

d) $d-\frac{3}{7}=\frac{2}{7}$ e) $e+\frac{7}{9}=1$ f) $1+f=\frac{6}{5}$

$d=\ldots\ldots$ $e=\ldots\ldots$ $f=\ldots\ldots$

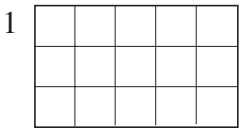
1 Use the diagram to help you do the calculations.



a) $\frac{1}{3} + \frac{1}{4} =$

b) $\frac{2}{3} + \frac{1}{12} - \frac{1}{4} =$

2 Use the diagram to help you do the calculations.

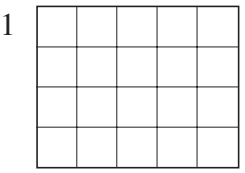


a) $\frac{1}{3} + \frac{2}{5} =$

b) $\frac{2}{3} - \frac{2}{5} =$

c) $\frac{1}{5} + \frac{2}{3} - \frac{3}{5} =$

3 Use the diagram to help you do the calculations.



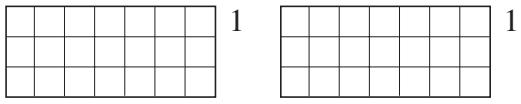
a) $\frac{1}{4} + \frac{2}{5} =$

b) $\frac{4}{5} - \frac{1}{4} =$

c) $\frac{1}{2} + \frac{3}{5} - \frac{3}{10} - \frac{3}{20} =$

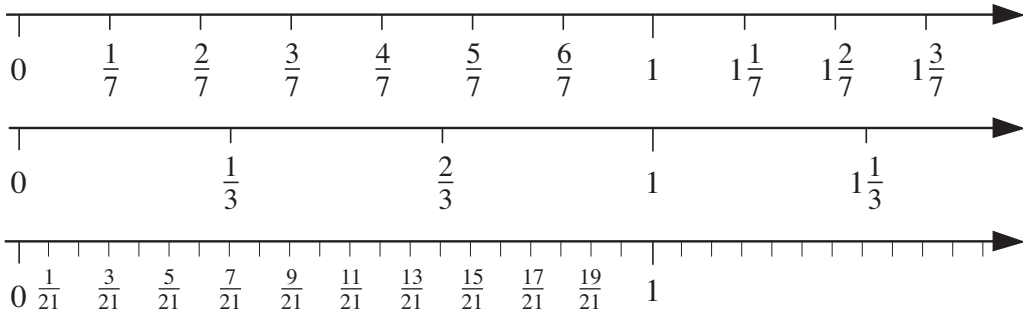
4 Add $\frac{2}{3}$ and $\frac{5}{7}$ in different ways. Complete the diagrams and equations.

a)



$\frac{2}{3} + \frac{5}{7} =$

b)



c) $\frac{2}{3} = \frac{4}{6} = \frac{6}{9} =$

$\frac{5}{7} = \frac{10}{14} =$

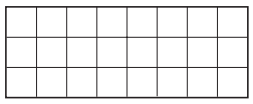
$\frac{2}{3} + \frac{5}{7} =$

1 Calculate the sums and differences. Write details in your exercise book.

a) i) $\frac{3}{7} + \frac{2}{7} =$ ii) $\frac{13}{20} - \frac{6}{20} =$ iii) $1 - \frac{5}{9} =$ iv) $1 + \frac{3}{8} =$

b) i) $\frac{4}{10} + \frac{2}{5} =$ ii) $\frac{3}{4} - \frac{5}{8} =$ iii) $\frac{5}{6} + \frac{1}{3} - \frac{1}{2} =$

2



This 3 × 8 rectangle is 1 unit.

Use it to help you do the additions and subtractions.

a) i) $\frac{3}{8} + \frac{4}{8} =$ ii) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} =$ iii) $\frac{7}{8} - \frac{3}{4} =$

b) i) $\frac{2}{3} + \frac{1}{8} =$ ii) $\frac{1}{3} + \frac{3}{8} =$ iii) $\frac{7}{8} - \frac{2}{3} =$

c) i) $\frac{1}{6} + \frac{5}{24} =$ ii) $\frac{5}{8} - \frac{1}{6} =$ iii) $\frac{5}{12} + \frac{7}{24} - \frac{1}{8} =$

3 People in Britain need to heat their houses for 7 months of the year.

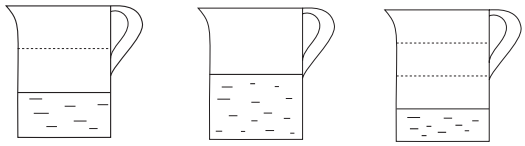
a) For what part of the year do British people **not** need to heat their houses? *Plan*:

Answer: . . . . . .

b) For how many months will British people heat their houses over the next 5 years? *Plan*:

Answer: . . . . . .

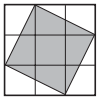
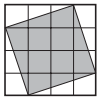
4 The 3 jugs each have a capacity of 5 litres.



The first jug is a third full, the second jug is half full and the third jug is a quarter full of water.

If all the water is poured into one of the jugs what part of the jug will be filled? *Plan*:

Answer: . . . . . .

5 a) What part of each square is shaded? i)  ii)  iii) 

b) Subtract the smallest from the greatest fraction.

1 Solve the equations.

a) $\frac{1}{2} + a = \frac{3}{2}$ b) $\frac{3}{4} - b = \frac{1}{4}$ c) $\frac{7}{8} + c = \frac{11}{8}$ d) $d - \frac{3}{7} = \frac{2}{7}$

a = ... b = ... c = ... d = ...

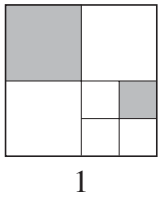
e) $e + \frac{7}{9} = 1$ f) $1 + f = \frac{6}{5}$ g) $2 - g = \frac{7}{5}$ h) $h - \frac{5}{6} = 1$

e = ... f = ... g = ... h = ...

2

a) What part of the unit square is shaded? .....

b) What part is **not** shaded? .....



c) What area is shaded if the area of the unit square is 64 m^2? .....

3 The first number in a sequence is $\frac{2}{3}$. We know that each of the other terms is $\frac{1}{2}$ more than the previous term. Write down the first five terms and add them up.

a_1: a_2: a_3: a_4: a_5:

$a_1 + a_2 + a_3 + a_4 + a_5$:

4 Mum made 18 butterfly cakes for Saturday tea.

a) If Andrew ate $\frac{1}{3}$ of them, how many cakes did he eat? .....

b) If Bella ate $\frac{2}{9}$ of them, how many cakes did she eat? .....

c) If Christine ate $\frac{2}{6}$ of them, how many cakes did she eat? .....

d) If Mum ate what was left, how many cakes did she eat? .....

5 Three eighths of a 4 m 24 cm long pipe was cut off.

a) What part of the pipe was left? .....

b) How many cm were cut off? *Plan*:

1 Do the calculations. Write details in your exercise book where needed.

a) i) $\frac{4}{15} + \frac{9}{15} =$ ii) $\frac{14}{20} - \frac{9}{20} =$ iii) $\frac{1}{2} + \frac{5}{3} + \frac{1}{3} - 1 =$

b) i) $\frac{3}{2} + \frac{3}{10} =$ ii) $\frac{17}{18} - \frac{2}{3} =$ iii) $\frac{5}{15} + \frac{1}{5} - \frac{1}{3} =$

c) i) $\frac{4}{7} + \frac{1}{6} =$ ii) $\frac{4}{5} - \frac{3}{11} =$ iii) $\frac{1}{2} + \frac{1}{3} - \frac{2}{5} =$

d) i) $\frac{3}{10} + \frac{6}{15} =$ ii) $\frac{7}{9} - \frac{1}{6} =$ iii) $\frac{7}{12} + \frac{3}{4} - \frac{9}{20} =$

2 Calculate:

a) $\frac{2}{3}$ of 60 metres . . . . . .

b) $\frac{1}{4}$ of 3 hours . . . . . .

c) $\frac{7}{5}$ of 40 litres . . . . . .

d) $2\frac{1}{4}$ times 80 kg . . . . . .

3 Calculate the whole quantity if:

a) $\frac{2}{3}$ of it is 60 metres . . . . . .

b) $\frac{1}{4}$ of it is 3 hours . . . . . .

c) $\frac{7}{5}$ of it is 35 litres . . . . . .

d) $2\frac{1}{4}$ times it is 90 kg . . . . . .

4 Jim was putting up a 120 m fence around his garden. On the first day he put up $\frac{3}{5}$ of the fence. How many metres of fence did he still have to put up?

5 I had 24 marbles. I lost 1 third of them, then I lost another 12 marbles.

a) How many marbles did I have left? . . . . . .

b) What part of the 24 marbles did I have left? . . . . . .

1 Exchange the quantities.

a) 1 week = ☐ days, 1 day = ☐ week, 4 days = ☐ week

b) 4 m = ☐ cm, 1 cm = ☐ m, 27 cm = ☐ m

c) 2 h = ☐ min, 1 min = ☐ hour, 40 min = ☐ hour

d) 17 litres = ☐ cl, 17 cl = ☐ litre, 320 ml = ☐ litre

2 Exchange the quantities. Do the calculations in your exercise book.

a) 20 min = ☐ hour, 45 min = ☐ hour, 90 min = ☐ hours

b) $\frac{1}{2}$ hour = ☐ min, $\frac{2}{5}$ hour = ☐ min, $\frac{61}{60}$ hour = ☐ min

c) 70 cm = ☐ m, 110 cm = ☐ m, 3 cm = ☐ m

d) $\frac{1}{5}$ m = ☐ cm, $\frac{9}{4}$ m = ☐ cm, $\frac{3}{50}$ m = ☐ cm

e) 43 cl = ☐ litre, 350 g = ☐ kg, 11 m = ☐ km

f) $\frac{5}{4}$ litres = ☐ cl, $\frac{42}{1000}$ kg = ☐ g, $\frac{32}{1000}$ km = ☐ m

3 Calculate the sums and differences.

a) $\frac{3}{50} + \frac{41}{50} - \frac{10}{50} =$

b) $\frac{6}{14} + \left(-\frac{9}{14}\right) =$

c) $\frac{5}{21} - \left(-\frac{2}{21}\right) =$

d) $-\frac{8}{15} + \left(-\frac{4}{15}\right) =$

e) $-\frac{7}{10} - \left(-\frac{2}{5}\right) =$

f) $-\frac{7}{10} - \left(+\frac{2}{5}\right) =$

4 Fill in the missing numbers. Do the calculations in your exercise book.

a) $\frac{4}{5} + \square = \frac{7}{5}$

b) $\frac{11}{8} - \square = \frac{3}{4}$

c) $\square + \frac{4}{9} = \frac{3}{9}$

d) $\square - \frac{2}{3} = \frac{1}{6}$

e) $\frac{8}{7} - \square + 2 = 3$

f) $\frac{5}{6} - \square = \frac{3}{4}$

5 Charlie spends a quarter of every week-day in school and 1 third of the day sleeping. How many hours does he have left for doing other things? ☐