



Fractions, decimals and percentages, brackets, and angles in polygons

Years 7–8 About 85 minutes No calculator
84 marks

Name _____

Class _____

Date _____

A Before you start

Recall

You will need these in every question below.

A1 Write down the lowest common multiple of 6 and 8.

[1 mark]

Answer

A2 Simplify $5x + 3 - 2x + 4$.

[1 mark]

Answer

A3 Work out $\frac{3}{4}$ of 36.

[1 mark]

Answer

A4 Two angles on a straight line add up to 180° . One of them is 74° . Work out the other.

[1 mark]

Answer

A5 Write 0.7 as a percentage, and as a fraction.

[2 marks]

Answer% and

Your teacher works through each example with you. Then try the one beside it on your own.

EXAMPLE 1

Work out $\frac{3}{4} + \frac{2}{5}$. Give your answer as a mixed number.

Hint Change both fractions to the same denominator. 20 is a multiple of 4 and of 5. Then add the tops only.

B1 Work out $\frac{5}{6} - \frac{3}{8}$.

[2 marks]

Answer

EXAMPLE 2

Each exterior angle of a regular polygon is 24° . How many sides does the polygon have? Work out the size of each interior angle.

Hint The exterior angles of any polygon add up to 360° . An interior angle and its exterior angle add up to 180° .

B2 Each exterior angle of a regular polygon is 40° . How many sides

[3 marks]

does the polygon have? Work out the size of each interior angle.

Answer sides interior angle $^\circ$

EXAMPLE 3

Write $\frac{3}{8}$ as a decimal and as a percentage.

Hint Divide 3 by 8 using short division, adding zeros after the decimal point. To change a decimal to a percentage, multiply by 100.

B3 Write $\frac{7}{40}$ as a decimal and as a percentage. [2 marks]

Answer and%

EXAMPLE 4

Expand and simplify $3(2x - 5) - 2(x - 4)$.

Hint Multiply every term inside each bracket by the number in front, with its sign. $-2 \times -4 = +8$. Then collect the x terms and the numbers.

B4 Expand and simplify
 $5(x + 3) - 3(2x - 1)$.

[3 marks]

Answer

C Practice

Core

Each question asks for something different. Show your working.

C1 Work out $\frac{7}{9} - \frac{1}{6}$. Give your answer in its simplest form.

[2 marks]

Answer

C2 Work out $4\frac{1}{6} - 2\frac{3}{4}$. Give your answer as a mixed number.

[3 marks]

Answer

C3 Write these numbers in order of size. Start with the smallest.

[2 marks]

$\frac{5}{8}$ 0.6 63% $\frac{2}{3}$

Answer

C4 Answer both parts.

(a) Write 0.45 as a fraction in its simplest form.

[1 mark]

Answer

(b) Write $\frac{11}{12}$ as a percentage. Give your answer to 1 decimal place.

[2 marks]

Answer

Total for C4: 3 marks

C5 Answer both parts.

(a) Expand $-4(3x - 5)$.

[1 mark]

Answer

(b) Factorise $20x - 28$ fully.

[2 marks]

Answer

Total for C5: 3 marks

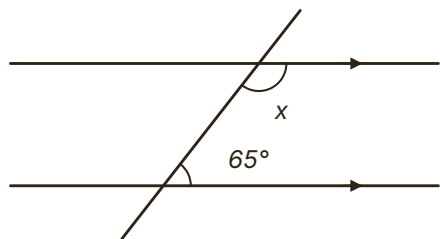
C6 A rectangle is 6 cm wide and $(2x + 5)$ cm long. Its area is 78 cm^2 . Work out the value of x . [3 marks]

Answer $x = \dots\dots$

C7 The interior angles of a hexagon are 100° , 115° , 130° , 125° , 140° and x° . Work out the value of x . [2 marks]

Answer $x = \dots\dots$

- C8** The diagram shows two parallel lines cut by a straight line. Work out the size of angle x . [2 marks]
Give a reason for your answer.



Not drawn accurately

Answer $x = \dots\dots^\circ$

- C9** Four of the exterior angles of a pentagon are 62° , 75° , 80° and 58° . Work out the fifth exterior angle, and the interior angle at that corner. [2 marks]

Answer exterior $\dots\dots^\circ$ interior $\dots\dots^\circ$

D Test-style questions

Stretch

Answer every question in the space given. Show your working: most of the marks are for method.

- D1** Ella says, " $\frac{3}{4} + \frac{2}{7} = \frac{5}{11}$." [3 marks]

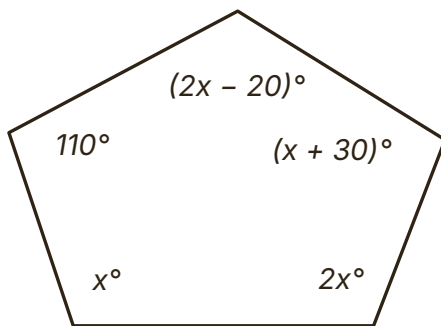
Explain why Ella is wrong, and work out the correct answer.

Answer

- D2** Two shops sell the same game. The normal price in both shops is £120. [4 marks]
 Shop A takes $\frac{3}{8}$ off the price. Shop B takes 35% off the price.
 Which shop sells the game for less, and by how much? You must show your working.

Answer Shop ... by £

- D3** The diagram shows a pentagon. Its interior angles are x° , $2x^\circ$, $(x + 30)^\circ$, $(2x - 20)^\circ$ and 110° .



Not drawn accurately

- (a) Show that $6x + 120 = 540$. [2 marks]

- (b) Work out the value of x . [2 marks]

Answer $x = \dots\dots$

- (c) Work out the size of the largest exterior angle of the pentagon. [2 marks]

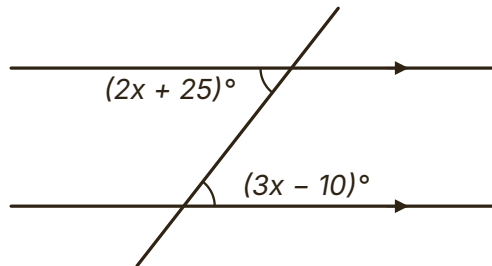
Answer

Total for D3: 6 marks

D4 Show that $4(3x + 5) - 2(3x - 2)$ is a multiple of 6 for every whole number x .

[3 marks]

D5 The diagram shows two parallel lines cut by a straight line. Work out the value of x , and the size of each of the marked angles. [3 marks]



Not drawn accurately

Answer $x = \dots\dots$ angle $= \dots\dots^\circ$

D6 Jo spends $\frac{1}{3}$ of her pocket money on a game and $\frac{1}{4}$ of it on food. She saves the rest. She saves £10. [3 marks]

How much pocket money did Jo have?

Answer

D7 There are 25 students in a class. $\frac{2}{5}$ of them walk to school. 0.28 of them come by car. 12% of them cycle. The rest come by bus.

(a) What percentage of the class comes by bus?

[2 marks]

Answer

(b) How many students come by bus?

[1 mark]

Answer

Total for D7: 3 marks

D8 Show that a regular polygon cannot have interior angles of 145° .

[2 marks]

D9 The perimeter of a rectangle is $(10x + 16)$ cm. The length of the rectangle is $(3x + 5)$ cm. Find an expression for its width. Give your answer in its simplest form.

[3 marks]

Answer

D10 A square, a regular hexagon and a third regular polygon fit together at a point with no gaps.

[3 marks]

How many sides does the third polygon have?

Answer

No route is given. Spend five minutes on a problem before you look at a hint. The hints are on the last page of the worksheet, and you can use one at a time.

- E1** Ana, Ben and Cal share a bag of sweets. Ana takes $\frac{1}{3}$ of the sweets. Ben takes $\frac{1}{4}$ of the sweets that are left. Cal takes the other 18 sweets. [3 marks]

How many sweets were in the bag?

Answer

- E2** Two whole numbers add up to 96. 40% of the larger number is equal to $\frac{2}{3}$ of the smaller number. What is the larger number? [3 marks]

Answer

- E3** a and b are numbers. $a(3x + 2) - 2(x - b) = 10x + 22$ for every value of x . Find a and b . [3 marks]

Answer $a = \dots\dots$ $b = \dots\dots$

E4 Regular polygon A has 3 more sides than regular polygon B . Each exterior angle of A is 10° smaller than each exterior angle of B . [4 marks]

How many sides does polygon A have?

Answer

F How did it go?

Colour one circle on each line.

	Not yet	Nearly	Yes
I can add and subtract fractions and mixed numbers by finding a common denominator.	☐	☐	☐
I can change between fractions, decimals and percentages, and put them in order of size.	☐	☐	☐
I can expand a single bracket, including with a negative number in front, and factorise fully.	☐	☐	☐
I can find angles in polygons and on parallel lines, and form an equation from them.	☐	☐	☐

Extension hints

Use one hint at a time. Cover the ones below it with a sheet of paper.

-
- E1**
- Hint 1** Work out what fraction of the whole bag each person takes.
- Hint 2** After Ana, $\frac{2}{3}$ of the bag is left. Ben takes $\frac{1}{4}$ of $\frac{2}{3}$, which is $\frac{1}{6}$ of the bag.
- Hint 3** Cal takes $1 - \frac{1}{3} - \frac{1}{6} = \frac{1}{2}$ of the bag. Half the bag is 18 sweets, so the bag held 36 sweets.
-
- E2**
- Hint 1** Write 40% as a fraction, then compare the two numbers.
- Hint 2** $\frac{2}{5}$ of the larger equals $\frac{2}{3}$ of the smaller, so the larger is $\frac{5}{3}$ of the smaller. The numbers are in the ratio 5 : 3.
- Hint 3** $5 + 3 = 8$ parts make 96, so one part is 12. The larger number is $5 \times 12 = 60$. Check: 40% of 60 is 24, and $\frac{2}{3}$ of 36 is 24.
-
- E3**
- Hint 1** Expand the left-hand side. The number of x s on each side must match, and so must the numbers on their own.
- Hint 2** $3ax + 2a - 2x + 2b$. The x terms give $3a - 2 = 10$.
- Hint 3** $3a - 2 = 10$ gives $a = 4$. The numbers give $2a + 2b = 22$, so $8 + 2b = 22$ and $b = 7$.
-
- E4**
- Hint 1** An exterior angle of a regular polygon with n sides is $360 \div n$.
- Hint 2** Try polygons B with 3, 4, 5, ... sides. For each one, work out the exterior angle of B and of the polygon with 3 more sides.
- Hint 3** B with 9 sides has exterior angles of 40° . A polygon with 12 sides has exterior angles of 30° . The difference is 10° , so A has 12 sides.