



Directed numbers, rounding, primes, area and simplifying

Year 7 About 80 minutes No calculator 88 marks

Name _____

Class _____

Date _____

A Before you start

Recall

You will need these in every question below.

A1 Work out 6×9 and $72 \div 8$.

[2 marks]

Answer and

A2 Write the number four thousand and sixty in figures.

[1 mark]

Answer

A3 Write these numbers in order of size. Start with the smallest.

[2 marks]

0.5 0.45 0.405 0.54

Answer

A4 Work out $3 + 4 \times 5$.

[1 mark]

Answer

A5 A rectangle is 6 cm long and 4 cm wide. Work out its area.

[1 mark]

Answer

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

EXAMPLE 1

Work out $-3 - (-8)$.

Hint Subtracting a negative number is the same as adding the positive number.

B1 Work out $-4 - (-11)$.

[2 marks]

Answer

EXAMPLE 2

A pencil is 14 cm long, correct to the nearest centimetre. Write down the lower bound and the upper bound of its length.

Hint The real length could be up to half a centimetre less or half a centimetre more than 14 cm.

B2 A bag of rice weighs 2.6 kg, correct to 1 decimal place. Write down the lower bound and the upper bound of its weight.

[2 marks]

Answer lower kg upper kg

EXAMPLE 3

Write 60 as a product of its prime factors.

Hint Divide by the smallest prime that goes in exactly. Keep going until you reach 1. Write each repeated prime as a power.

B3 Write 126 as a product of its prime factors. Give your answer in index form.

[2 marks]

Answer

EXAMPLE 4

Simplify $5a + 3b - 2a + b$.

Hint Collect the a terms together and the b terms together. Each term keeps the sign in front of it.

B4 Simplify $7x - 2y + 3x + 5y - x$. [2 marks]

Answer

C Practice

Core

Each question asks for something different. Show your working.

C1 A seagull is flying 12 m above sea level. A crab sits on a rock 7 m below sea level.

(a) Write the height of the crab as a directed number. [1 mark]

Answer

(b) Work out the vertical distance between the seagull and the crab. [1 mark]

Answer

(c) The seagull dives straight down 15 m into the sea. At what height is it now? [1 mark]

Answer

Total for C1: 3 marks

C2 Work out $(-6) \times (-4) \div (-3)$. [2 marks]

Answer

C3 Here is a number: 27 386.49

(a) Write down the value of the digit 3. [1 mark]

Answer

(b) Round the number to the nearest hundred.

[1 mark]

Answer

(c) Round the number to 1 decimal place.

[1 mark]

Answer

(d) Round the number to 1 significant figure.

[1 mark]

Answer

Total for C3: 4 marks

C4 Write down all the numbers that are factors of both 36 and 90.

[2 marks]

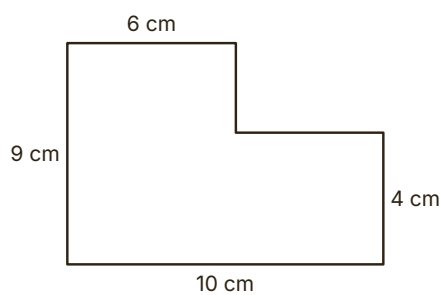
Answer

C5 Write down all the prime numbers between 30 and 50.

[2 marks]

Answer

C6 The diagram shows a shape made from rectangles. All the corners are right angles.



Not drawn accurately

(a) Work out the perimeter of the shape.

[2 marks]

Answer

(b) Work out the area of the shape.

[2 marks]

Answer

Total for C6: 4 marks

C7 A triangle has an area of 60 cm^2 and a base of 15 cm. Work out its perpendicular height. [2 marks]

Answer

C8 $a = 3$ and $b = -2$.

(a) Work out the value of $4a - 5b$.

[2 marks]

Answer

(b) Work out the value of $a^2 + 6b$.

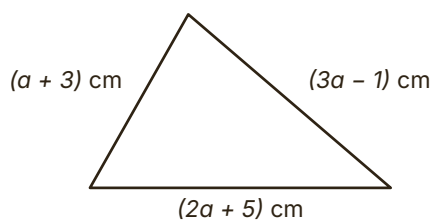
[2 marks]

Answer

Total for C8: 4 marks

- C9** The lengths of the sides of this triangle are given in centimetres. Write a simplified expression for the perimeter of the triangle.

[2 marks]



Not drawn accurately

Answer

D Test-style questions

Stretch

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

- D1** A quiz has 20 questions. A correct answer scores 3 points. A wrong answer scores -1 point. A question left blank scores 0 points.

- (a) Kai gets 12 answers right and 6 wrong, and leaves 2 blank. Work out his score.

[2 marks]

Answer

- (b) Lucy answers every question. She scores 40 points. How many questions did she get right?

[2 marks]

Answer

Total for D1: 4 marks

- D2** Sam says, "A pencil is 6.4 cm long, correct to 1 decimal place. So the longest it could be is 6.5 cm." [2 marks]

Sam is wrong. Explain why, and write down the correct upper bound.

- D3** A rectangular garden is 14 m long and 9 m wide. Each length is measured to the nearest metre. A fence goes all the way round the edge of the garden. [3 marks]

Work out the upper bound of the length of the fence.

Answer

- D4** Round each number to 1 significant figure to estimate the value of [3 marks]

$$\frac{589 \times 41}{19.7}$$

You must show your working.

Answer

- D5** A baker has 72 chocolate cookies and 90 oat cookies. She packs all of them into boxes. Every box must hold the same number of chocolate cookies and the same number of oat cookies. No cookies are left over. [3 marks]
- (a) Work out the greatest number of boxes she can fill. You must show your working.

Answer

(b) How many cookies of each type are in each box?

[1 mark]

Answer ... chocolate and ... oat

(c) She also bakes muffins in trays of 12. Paper cases come in packets of 30. She bakes whole trays and uses whole packets, with one case for each muffin and none left over. Work out the smallest number of muffins she can bake.

[2 marks]

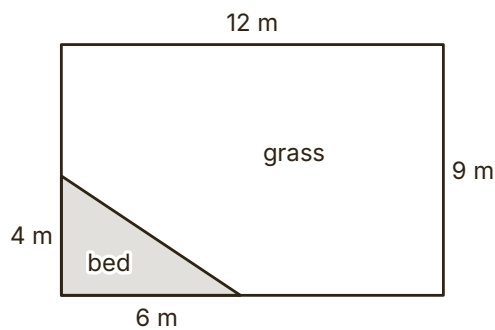
Answer

Total for D5: 6 marks

D6 The diagram shows a rectangular garden that is 12 m long and 9 m wide. A flower bed in one corner is a right-angled triangle with sides of 6 m and 4 m along the edges of the garden. The rest of the garden is grass.

[5 marks]

One box of grass seed covers 20 m^2 and costs £4.50. Work out the cost of the grass seed for the grass.



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Answer

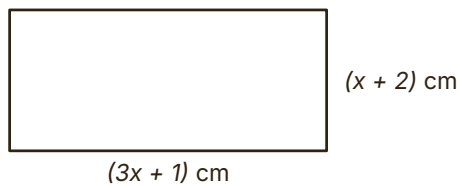
- D7** A square has the same perimeter as a rectangle that is 11 cm long and 5 cm wide. Work out the area of the square. [3 marks]

Answer

- D8** Work out the value of $3p^2 - 2q$ when $p = -4$ and $q = -5$. [3 marks]

Answer

- D9** The diagram shows a rectangle. The lengths of its sides are in centimetres.



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- (a)** Show that the perimeter of the rectangle is $(8x + 6) \text{ cm}$. [2 marks]

- (b)** Work out the perimeter when $x = 5$. [1 mark]

Answer

Total for D9: 3 marks

- D10** A pack of 1000 sheets of paper is 12 cm thick. Work out the thickness of one sheet. Give your answer in millimetres. [2 marks]

Answer

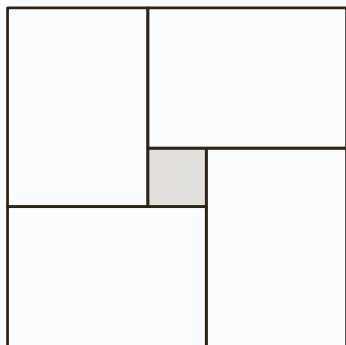
No route is given. Spend five minutes on a problem before you look at a hint. The hints are on the last page of the worksheet, and you can use one at a time.

- E1** A whole number N is between 100 and 150. When N is divided by 4, by 5 or by 6, the remainder is 3 each time. Find N . [3 marks]

Answer

- E2** Four identical rectangles are placed round a square hole to make a large square, as shown. The large square has a perimeter of 56 cm. The square hole has an area of 16 cm^2 . [4 marks]

Work out the area of one rectangle.



Not drawn accurately

Answer

E3 Three numbers a , b and c add in pairs like this:

[4 marks]

$$a + b = -3 \quad b + c = 7 \quad a + c = -8$$

Work out the value of abc .

Answer

E4 a and b are positive whole numbers, and a is greater than b . The expression $3a + 2b - a + 4b$ has the value 30.

[3 marks]

How many different pairs of values can a and b have?

Answer

F How did it go?

Colour one circle on each line.

	Not yet	Nearly	Yes
I can add, subtract, multiply and divide with negative numbers.	☐	☐	☐
I can round numbers and write down the upper and lower bounds of a rounded measurement.	☐	☐	☐
I can write a number as a product of primes and find the HCF and LCM of two numbers.	☐	☐	☐
I can work out the perimeter and area of rectangles, triangles and shapes made from them.	☐	☐	☐
I can simplify an expression and substitute numbers into it.	☐	☐	☐

Extension hints

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

-
- E1**
- Hint 1** Look at the number that is 3 less than N . What do 4, 5 and 6 do to it?
- Hint 2** $N - 3$ divides exactly by 4, 5 and 6, so it is a multiple of their lowest common multiple, 60.
- Hint 3** $N - 3$ could be 60, 120 or 180, so N is 63, 123 or 183. Only 123 is between 100 and 150.
-
- E2**
- Hint 1** Call the long side of a rectangle a and the short side b . Write the side of the large square and the side of the hole using a and b .
- Hint 2** The large square has side $a + b = 14$ cm. The hole has side $a - b = 4$ cm.
- Hint 3** So $a = 9$ and $b = 5$, and one rectangle has area $9 \times 5 = 45$ cm². You can check: $(196 - 16) \div 4 = 45$.
-
- E3**
- Hint 1** Add all three pairs together. Each number is counted twice.
- Hint 2** $2a + 2b + 2c = -4$, so $a + b + c = -2$.
- Hint 3** Then $c = -2 - (-3) = 1$, $a = -2 - 7 = -9$ and $b = -2 - (-8) = 6$. So $abc = -9 \times 6 \times 1 = -54$.
-
- E4**
- Hint 1** Simplify the expression first.
- Hint 2** It simplifies to $2a + 6b$. So $2a + 6b = 30$, which means $a + 3b = 15$.
- Hint 3** Try $b = 1, 2, 3, \dots$. The pairs $a = 12, b = 1$ and $a = 9, b = 2$ and $a = 6, b = 3$ work. With $b = 4, a = 3$, which is less than b . So there are 3 pairs.