



One-step equations, nth terms and angle facts

Years 7–8 About 80 minutes No calculator
85 marks

Name _____

Class _____

Date _____

A Before you start

Recall

You will need these in every question below.

A1 Work out $-5 + 12$ and -3×4 .

[2 marks]

Answer and

A2 Simplify $4n + 3 - n + 5$.

[2 marks]

Answer

A3 Work out the value of $5n - 2$ when $n = 6$.

[1 mark]

Answer

A4 How many degrees are there in a full turn? How many degrees are there on a straight line?

[2 marks]

Answer full turn straight line

A5 Write down the next two terms of this sequence.

[1 mark]

19, 24, 29, 34, ...

Answer

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

EXAMPLE 1

Solve $x - 7 = -3$.

Hint Undo the subtraction: add 7 to both sides. Then check your answer in the equation.

B1 Solve $y + 9 = 2$.

[2 marks]

Answer $y = \dots\dots$

EXAMPLE 2

Solve $\frac{x}{3} = -8$.

Hint Undo the division: multiply both sides by 3.

B2 Solve $\frac{n}{5} = -9$.

[2 marks]

Answer $n = \dots\dots$

EXAMPLE 3

Find the n th term of the sequence
15, 19, 23, 27, ...

Hint The terms go up by 4, so the rule starts with $4n$. Compare $4n$ with the terms to find what to add.

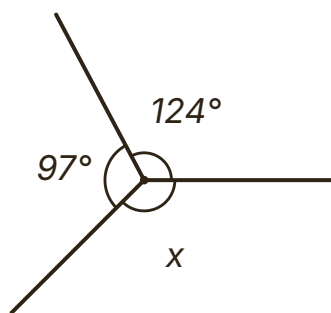
B3 Find the n th term of the
sequence 15, 23, 31, 39, ...

[2 marks]

Answer

EXAMPLE 4

Three angles meet at a point. Work out the size of angle x .

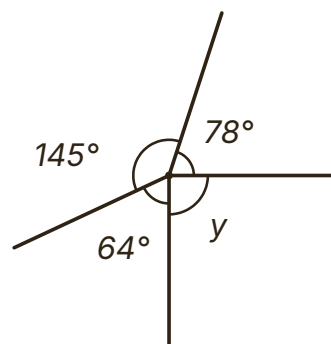


Not drawn accurately

Hint Angles at a point add up to 360° .

B4 Four angles meet at a point. Work out the size of angle y .

[2 marks]



Not drawn accurately

Answer $y = \dots\dots$

c Practice

Core

Each question asks for something different. Show your working.

C1 Solve $12 = p - 15$.

[2 marks]

Answer $p = \dots\dots$

C2 A rectangle has an area of 63 cm^2 and a width of 7 cm . Its length is $l \text{ cm}$.

[2 marks]

Write down an equation in l . Solve it to find the length.

Answer $l = \dots\dots$

C3 The n th term of a sequence is $6n - 4$.

(a) Work out the 15th term.

[1 mark]

Answer

(b) Is 100 a term in the sequence? You must show your working.

[2 marks]

Answer

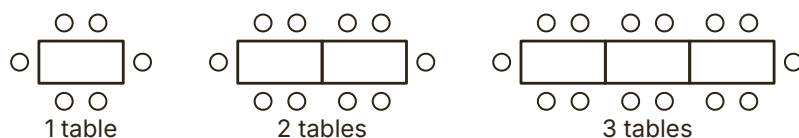
Total for C3: 3 marks

C4 The n th term of a sequence is $12 - 3n$. Write down the first four terms.

[2 marks]

Answer

C5 Square tables are pushed together in a row. The diagram shows how many people can sit at 1, 2 and 3 tables.



(a) Find an expression for the number of people who can sit at n tables.

[2 marks]

Answer

(b) How many tables are needed to seat 50 people?

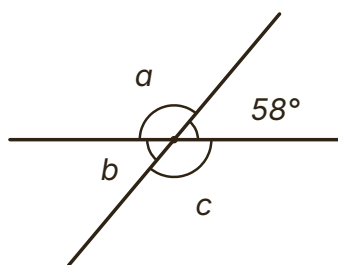
[2 marks]

Answer

Total for C5: 4 marks

C6 Two straight lines cross. Work out the sizes of angles a , b and c .

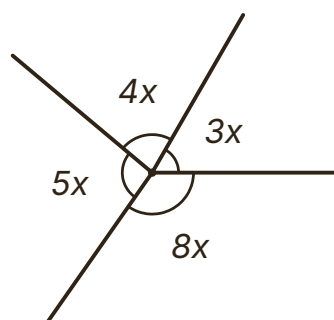
[3 marks]



Not drawn accurately

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

C7 Four angles meet at a point.



Not drawn accurately

(a) Work out the value of x .

[2 marks]

Answer $x = \dots\dots$

(b) Work out the size of the largest angle.

[1 mark]

Answer

Total for C7: 3 marks

C8 Here are four equations.

[2 marks]

$$A : x + 10 = 4 \quad B : 2x = 12 \quad C : \frac{x}{3} = 2 \quad D : 9 - x = 15$$

Which two equations have the solution $x = -6$?

Answer ... and ...

C9 The 3rd term of a linear sequence is 17. The 8th term is 47. Find the n th term of the sequence.

[3 marks]

Answer

D Test-style questions

Stretch

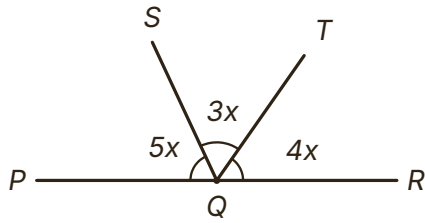
Answer every question in the space given. Show your working: most of the marks are for method.

D1 Tom says, "The n th term of the sequence 13, 16, 19, 22, ... is $n + 3$, because the terms go up by 3."

[2 marks]

Tom is wrong. Explain why, and find the correct n th term.

- D2** PQR is a straight line. Work out the size of angle PQS . You must show your working. [3 marks]



Not drawn accurately

Answer

- D3** Five adult cinema tickets cost £42.50 altogether.

- (a) One adult ticket costs £ t . Write down an equation in t and solve it. [2 marks]

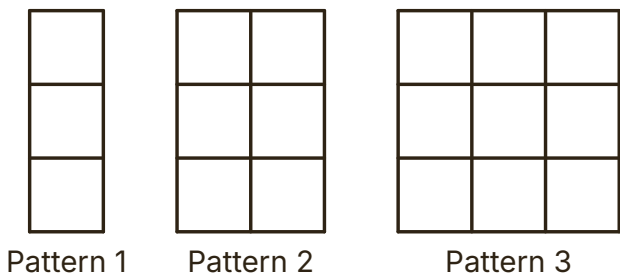
Answer $t = \dots\dots$

- (b) A child ticket costs £3.25 less than an adult ticket. Kim buys 1 adult ticket and 2 child tickets. How much does she pay? [2 marks]

Answer

Total for D3: 4 marks

D4 Jo makes grids of squares from sticks. Every grid is 3 squares tall. Here are the first three patterns.



(a) Find an expression for the number of sticks in Pattern n . [2 marks]

Answer

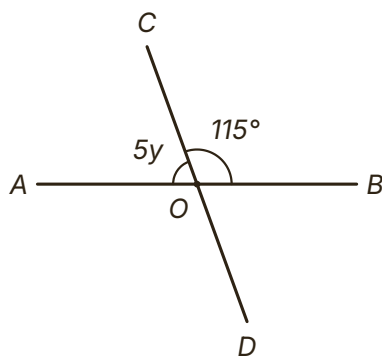
(b) How many sticks are in Pattern 25? [1 mark]

Answer

(c) Jo has 160 sticks. She makes the largest pattern she can. Which pattern does she make, and how many sticks are left over? [3 marks]

Answer Pattern sticks left over
Total for D4: 6 marks

D5 AB and CD are straight lines that cross at O .



Not drawn accurately

(a) Work out the value of y .

[2 marks]

Answer $y = \dots\dots$

(b) Work out the size of angle AOD . Give a reason for your answer.

[2 marks]

Answer

Total for D5: 4 marks

D6 Ana's bank balance is $\pounds b$. She pays in $\pounds 35$. Her balance is now $-\pounds 18$.

[3 marks]

Write down an equation in b . Solve it to find Ana's balance before she paid in.

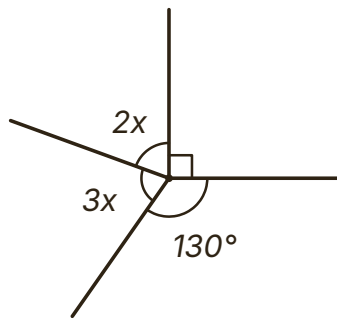
Answer $b = \dots\dots$

D7 The n th term of a sequence is $40 - 7n$. Work out the first term of the sequence that is negative. Give the term, not its position.

[3 marks]

Answer

- D8** Four angles meet at the point O . One of them is a right angle. Work out the size of the smaller of the two angles marked with x . You must show your working. [4 marks]



Not drawn accurately

Answer

- D9** An equilateral triangle has a perimeter of 57 cm.

(a) Each side is s cm. Write down an equation in s and solve it. [2 marks]

Answer $s = \dots\dots$

(b) A square has the same perimeter as the triangle. Work out the length of one side of the square. [1 mark]

Answer

Total for D9: 3 marks

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 Here are the first terms of two sequences.

[4 marks]

Sequence *A*: 3, 10, 17, 24, ...

Sequence *B*: 103, 98, 93, 88, ...

Both sequences carry on in the same way. What is the largest number that is in both sequences?

Answer

E2 What is the size of the smaller angle between the hour hand and the minute hand of a clock at 8:24?

[3 marks]

Answer

E3 A purse holds 9 coins. Every coin is either a 20p coin or a 50p coin. The coins are worth £3.00 altogether. How many 50p coins are in the purse?

[3 marks]

Answer

E4 The n th term of a sequence is $4n + 3$. How many terms of the sequence are between 150 and 250? [3 marks]

Answer

F How did it go?

Colour one circle on each line.

	Not yet	Nearly	Yes
I can solve one-step equations, including ones with negative numbers and with the unknown on the right.	☐	☐	☐
I can find and use the n th term of a linear sequence.	☐	☐	☐
I can use angles on a straight line, angles at a point and vertically opposite angles to find missing angles.	☐	☐	☐

Extension hints

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

-
- E1**
- Hint 1** Find the n th term of each sequence.
- Hint 2** Sequence A is $7n - 4$ and sequence B is $108 - 5n$. A number in both is 3 more than a multiple of 7 and 3 more than a multiple of 5.
- Hint 3** The numbers in both are 3, 38, 73, 108, ... Sequence B never reaches 108, because it starts at 103 and goes down. So the largest is 73.
-
- E2**
- Hint 1** In one hour the minute hand turns 360° and the hour hand turns 30° . Find how far each turns in one minute.
- Hint 2** The minute hand turns 6° a minute, so at 8:24 it is 144° round from 12. The hour hand turns 0.5° a minute, so it is $240 + 12 = 252^\circ$ round from 12.
- Hint 3** The angle between them is $252 - 144 = 108^\circ$. This is less than 180° , so it is the smaller angle.
-
- E3**
- Hint 1** Call the number of 50p coins f . Then there are $9 - f$ coins of 20p.
- Hint 2** If all 9 coins were 20p they would be worth 180p. That is 120p short of 300p.
- Hint 3** Swapping a 20p coin for a 50p coin adds 30p. So $120 \div 30 = 4$ coins must be 50p.
-
- E4**
- Hint 1** Find the first term above 150 and the last term below 250.
- Hint 2** $4 \times 37 + 3 = 151$ is the first term above 150. $4 \times 61 + 3 = 247$ is the last term below 250.
- Hint 3** The terms between them are the 37th up to the 61st, which is $61 - 37 + 1 = 25$ terms.