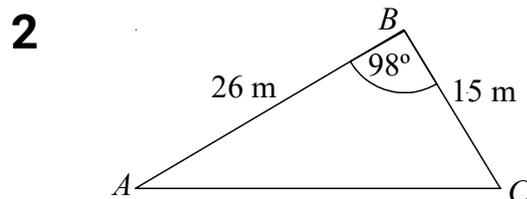# Higher (Grade 7-9) GCSE Mini Test 3

1 Simplify fully $\dfrac{3x + 6}{x} \div \dfrac{3x^2 + 2x - 8}{x^2 - 2x}$

2

Work out the length of AC.
Give your answer to 3 significant figures.

3 Given that $f(x) = 3x + 1$ and $g(x) = x^2 - 5$

Find $fg(3)$

4 Simplify fully $\dfrac{(5 + 2\sqrt{3})(5 - 2\sqrt{3})}{\sqrt{3}}$

You must show all your working.

5 Using $x_{n+1} = 3 + \dfrac{8}{x_n^2}$

With $x_0 = 3$

Find the values of x_1, x_2 and x_3.

6 a is directly proportional to b

When $a = 10$, $b = 8$

Find the value of b when $a = 14$

7 $a = \dfrac{b}{c}$

$b = 23.65$ correct to 2 decimal places
$c = 5.7$ correct to 1 decimal place

Work out the upper bound for a.
Give your answer to 2 decimal places.

8
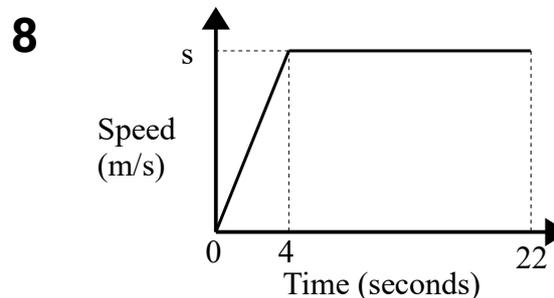
The total distance travelled is 200m.
Find the value of s.

9 A straight line, L, passes through the point with coordinates (6,5) and is perpendicular to the line with equation $y = 3x + 1$

Find an equation of the straight line L.

10 The coordinates of the maximum point of a curve are (-4, 2)

Write down the coordinates of the maximum point of the curve with equation $y = f(-x)$

11 n is an integer.

Prove algebraically that the sum of $(n + 2)(n + 1)$ and $n + 2$ is always a square number.

12 There are 9 counters in a bag.

5 of the counters are red.
4 of the counters are blue.

Two counters are taken at random from the bag.

Work out the probability that two red counters are taken.

13 Solve $3x^2 - 20x + 12 < 0$

14 Solve the simultaneous equations:
$$x^2 + y^2 = 73$$
$$y = 3x - 1$$

15 By completing the square, find the turning point of the graph with equation $y = x^2 + 6x - 1$

16 Prove algebraically that the recurring decimal $0.\dot{7}\dot{8}$ can be written as $\frac{26}{33}$

17 Cone A and Cone B are mathematically similar.

The volume of Cone A is 250 cm^3 and the volume of Cone B is 16 cm^3.

The total surface area of Cone B is 12 cm^2.

Calculate the total surface area of Cone A.

18 $ABCD$ is a parallelogram
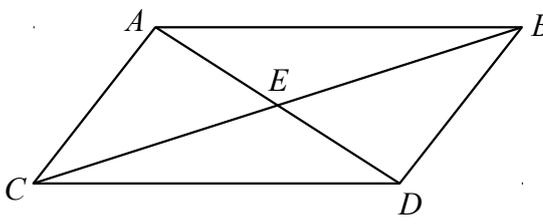
Prove that triangle ACE is congruent to triangle BDE.

19 Here are the first 5 terms of a quadratic sequence.

| 1 | 6 | 17 | 34 | 57 |

Find an expression, in terms of n, for the nth term of this sequence.

20 Sketch the graph of $y = \sin x°$ for $0 \leq x \leq 360$