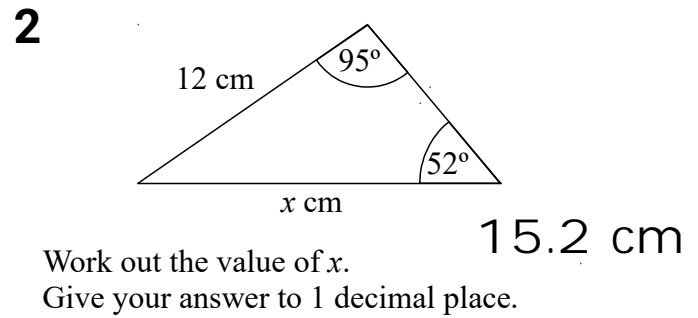


## Higher (Grade 7-9) GCSE Mini Test 5

**1** Simplify fully  $\frac{2x+6}{x-3} \div \frac{2x^2+7x+3}{x^2-9}$

$$\frac{2(x+3)}{2x+1}$$



**3** Given that  $g(x) = \frac{2x+6}{5}$   
Work out an expression for  $g^{-1}(x)$

$$g^{-1}(x) = \frac{5x-6}{2}$$

**4** Show that  $\frac{1}{\frac{1}{\sqrt{3}} + \sqrt{3}}$  can be written as  $\frac{\sqrt{3}}{4}$

$$\frac{1}{\sqrt{3}} \times \sqrt{3} = \frac{\sqrt{3}}{\sqrt{3} \times \sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\frac{\sqrt{3}}{3} + \sqrt{3} = \frac{\sqrt{3}}{3} + \frac{3\sqrt{3}}{3} = \frac{4\sqrt{3}}{3}$$

$$1 \div \frac{4\sqrt{3}}{3} = \frac{3}{4\sqrt{3}}$$

$$\frac{3}{4\sqrt{3}} \times \sqrt{3} = \frac{3\sqrt{3}}{4\sqrt{3} \times \sqrt{3}} = \frac{3\sqrt{3}}{12} = \frac{\sqrt{3}}{4}$$

**5** Using  $x_{n+1} = \frac{10}{x_n^2 + 4}$   
With  $x_0 = 1$   
Find the values of  $x_1$ ,  $x_2$  and  $x_3$ .

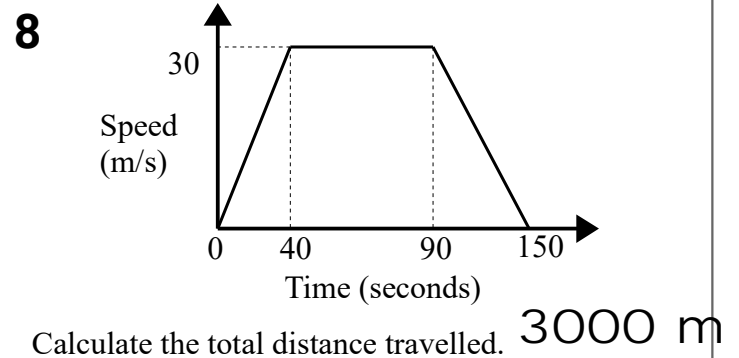
$x_1 = 2$   
 $x_2 = 1.25$   
 $x_3 = 1.797752809$

**6**  $y$  is inversely proportional to the cube of  $x$   
When  $y = 0.5$ ,  $x = 2$   
Find the value of  $y$  when  $x = 4$

$$y = \frac{1}{16}$$

**7**  $f = \frac{\sqrt{g}}{h}$   
 $g = 22$  correct to 2 significant figures  
 $h = 9.2$  correct to 1 decimal place  
Work out the upper bound for  $f$ .  
Give your answer to 2 decimal places.

$$0.52$$



**9** The point  $A$  has the coordinates  $(2,7)$   
The point  $B$  has the coordinates  $(8,4)$   
Find the equation of the perpendicular bisector to  $AB$ .

$$y = 2x - 4.5$$

**10** The coordinates of the turning point of a curve are  $(-4, 2)$   
Write down the coordinates of the turning point of the curve with equation  $y = -f(x)$

$$(-4, -2)$$

**11** Prove algebraically that the sum of any three consecutive even integers is always a multiple of 6.

$$2n + 2n + 2 + 2n + 4$$

$$6n + 6$$

$$6(n + 1)$$

**12** There are 12 counters in a bag.

5 of the counters are red.

4 of the counters are blue.

3 of the counters are green.

$$\begin{array}{r} 94 \\ 132 \end{array}$$

Billie takes two counters are taken at random from the bag.

Work out the probability that both of the counters Billie takes are different colours.

**13** Solve  $x^2 - 2x - 24 \geq 0$

$$x \leq -4$$

or

$$x \geq 6$$

**14** Solve the simultaneous equations:

$$x^2 + y^2 = 16$$

$$2x + y = 8$$

$$x = 4$$

$$x = 2.4$$

$$y = 0$$

or

$$y = 3.2$$

**15** By completing the square, find the turning point of the graph with equation  $y = x^2 - x + 10$

$$(0.5, 9.75)$$

**16** Prove algebraically that the recurring decimal

$$0.2\dot{1}\dot{8} \text{ can be written as } \frac{12}{55} \quad x = \frac{216}{990}$$

$$10x = 2.\dot{1}\dot{8}$$

$$1000x = 218.\dot{1}\dot{8}$$

$$990x = 216$$

$$= \frac{12}{55}$$

**17** Cylinder A and Cylinder B are mathematically similar.

The surface area of Cylinder A is  $50 \text{ cm}^2$  and the surface area of Cylinder B is  $128 \text{ cm}^2$ .

The height of Cylinder A is 7 cm.

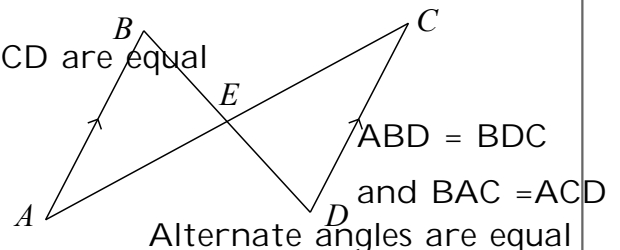
Calculate the height of Cylinder B.

$$11.2 \text{ cm}$$

**18**  $AB$  and  $CD$  are parallel and equal in length.

$AB$  and  $CD$  are equal

given



Prove that triangle  $ABE$  and triangle  $CDE$  are congruent.

ASA

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

3      5      8      12      17

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

$$\frac{1}{2}n^2 + \frac{1}{2}n + 2$$

**20**

Sketch the graph of  $y = \tan x^\circ$  for  $0 \leq x \leq 360$

