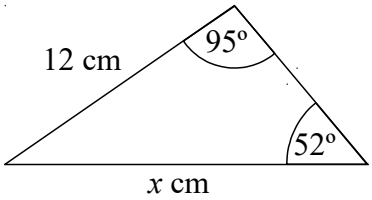
Higher (Grade 7-9) GCSE Mini Test 5

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

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

2



Work out the value of x.
Give your answer to 1 decimal place.

15.2 cm

3 Given that $g(x) = \dfrac{2x+6}{5}$

Work out an expression for $g^{-1}(x)$

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

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

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

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

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

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

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

5 Using $x_{n+1} = \dfrac{10}{x_n^2 + 4}$

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 $x = 4$

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

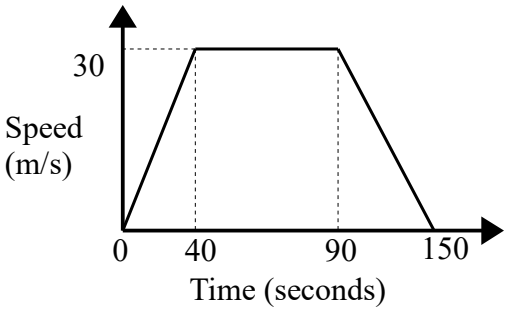
7 $$f = \frac{\sqrt{g}}{h}$$

$g = 22$ 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

8



Calculate the total distance travelled. 3000 m

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.

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.

$\frac{94}{132}$

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

$x \leq -4$

or

$x \geq 6$

14 Solve the simultaneous equations:

$x^2 + y^2 = 16$

$2x + y = 8$

$x = 4$, $y = 0$ or $x = 2.4$, $y = 3.2$

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 $0.2\dot{1}\dot{8}$ can be written as $\frac{12}{55}$

$x = 0.2\dot{1}\dot{8}$

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

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

$990x = 216$

$x = \frac{216}{990}$

$= \frac{12}{55}$

17 Cylinder A and Cylinder B are mathematically similar.

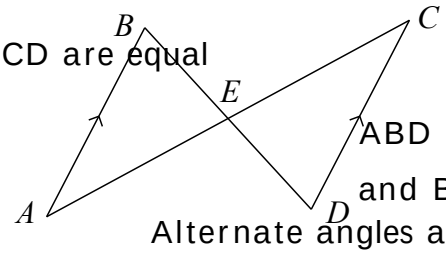
The surface area of Cylinder A is 50 cm^2 and the surface area of Cylinder B is 128 cm^2.

The height of Cylinder A is 7 cm.

Calculate the height of Cylinder B.

11.2 cm

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



AB and CD are equal given

ABD = BDC and BAC = ACD Alternate angles are equal

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 $y = \tan x°$ for $0 \leq x \leq 360$