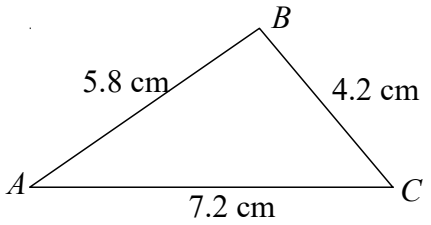
Higher (Grade 7-9) GCSE Mini Test 4

1 Solve $\frac{7}{x-3} + \frac{10}{x+1} = 3$

$x = \frac{2}{3}$ $\quad$ $x = 7$

2



Work out the size of angle BAC.
Give your answer to 3 significant figures.

35.7^o

3 The function f is defined such that

$f(x) = x^2 + 2x - 5$

Find an expression for $f(x - 2)$

$f(x - 2) = x^2 - 2x - 5$

4 Rationalise the denominator $\frac{6}{\sqrt{2}}$

$3\sqrt{2}$

5 Show that the equation $2x^3 - 3x = 2$ has a solution between $x = 1$ and $x = 2$

$2(1)^3 - 3(1) = -1$

$2(2)^3 - 3(2) = 10$

2 is between -1 and 10

6 y is directly proportional to the square of x

When $y = 15$, $x = 5$

Find the value of y when $x = 10$

$y = 60$

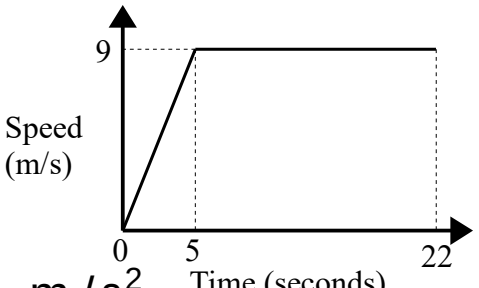
7 $v = \frac{s}{t}$

$s = 4.15$ correct to 2 decimal places
$t = 2.8$ correct to 1 decimal place

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

1.51

8



$1.8\ m/s^2$

Calculate the acceleration in the first 5 seconds.

9 A circle has the equation $x^2 + y^2 = 13$

(i) Write down the coordinates of the centre of the circle. (0,0)

(ii) Write down the exact length of the radius of the circle.

$\sqrt{13}$

10 The coordinates of the maximum point of a curve are (1, 5)

Write down the coordinates of the maximum point of the curve with equation $y = f(x - 2) + 3$

(3,8)

11 Prove that $(2n + 3)^2 - (2n - 3)^2$ is always a multiple of 12, for all positive integer values of n.

$4n^2 + 12n + 9 - (4n^2 - 12n + 9)$

$4n^2 + 12n + 9 - 4n^2 - 12n - 9$

$24n$

$12(2n)$

12 Here are seven number cards.

1	1	2	2	3	3	3

Helen takes a card at random.
She does not replace the card. $\frac{10}{42}$

Helen then takes another card at random.

Calculate the probability that both cards have the same number on them.

13 Solve $x^2 + x - 30 \leq 0$

$-6 \leq x \leq 5$

14 Solve the simultaneous equations:

$x^2 + y^2 = 29$

$2x - y = 8$

$x = 5$ $\quad y = 2$ or $x = 1.4$ $\quad y = -5.2$

15 By completing the square, find the turning point of the graph with equation $y = x^2 - 4x - 9$

$(2, -13)$

16 Prove algebraically that the recurring decimal $0.5\dot{7}$ can be written as $\frac{26}{45}$

$x = 0.5\dot{7}$

$10x = 5.\dot{7}$

$100x = 57.\dot{7}$

$90x = 52$

$x = \frac{52}{90}$

$x = \frac{26}{45}$

17 Cylinder A and Cylinder B are mathematically similar.

The length of Cylinder A is 10 cm and the length of Cylinder B is 12 cm.

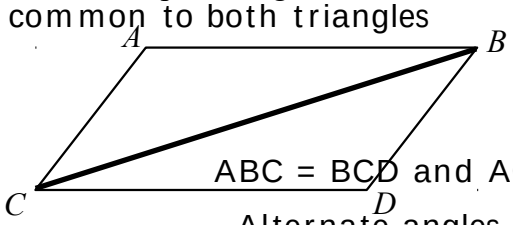
The total surface area of Cylinder A is 75 cm^2.

Calculate the total surface area of Cylinder B.

$108\ cm^2$

18 $ABCD$ is a parallelogram

BC is common to both triangles



ABC = BCD and ACB = CBD

Alternate angles are equal

Prove that triangle ABC is congruent to triangle BCD.

ASA

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

2 9 18 29 42

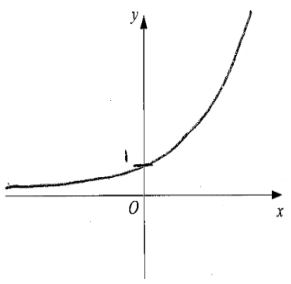
Find an expression, in terms of n, for the nth term of this sequence.

$n^2 + 4n - 3$

20

Sketch the curve with equation $y = 2^x$

Give the coordinates of any points of intersection with the axes.



(0, 1)