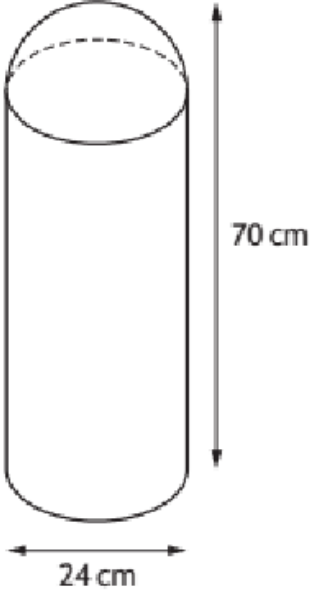


1.	Express $x^2 - 14x + 44$ in the form $(x - a)^2 + b$.
2.	Multiply out the brackets and collect like terms $(x - 4)(x^2 + x - 2)$.
3.	There are 964 pupils on the roll of Aberleven High School. It is forecast that the roll will decrease by 15% per year. What will be the expected roll after 3 years? Give your answer to the nearest ten.
4.	<p>A traffic bollard is in the shape of a cylinder with a hemisphere on top.</p> <p>The bollard has</p> <ul style="list-style-type: none">• diameter 24 centimetres• height 70 centimetres.  <p>Calculate the volume of the bollard. Give your answer correct to 3 significant figures.</p>

5.	<p>(a) Factorise $4x^2 - 25$.</p> <p>(b) Hence simplify $\frac{4x^2 - 25}{2x^2 - x - 10}$.</p>
6.	<p>Solve algebraically the inequality</p> $11 - 2(1 + 3x) < 39$
7.	<p>A runner has recorded her times, in seconds, for six different laps of a running track.</p> <p style="text-align: center;">53 57 58 60 55 56</p> <p>(a) (i) Calculate the mean of these lap times. Show clearly all your working. 1</p> <p>(ii) Calculate the standard deviation of these lap times. Show clearly all your working. 3</p> <p>(b) She changes her training routine hoping to improve her consistency. After this change, she records her times for another six laps. The mean is 55 seconds and the standard deviation 3.2 seconds. Has the new training routine improved her consistency? Give a reason for your answer. 1</p>
8.	<p>Ten couples took part in a dance competition. The couples were given a score in each round. The scores in the first round were</p> <p style="text-align: center;">16 27 12 18 26 21 27 22 18 17</p> <p>(a) Calculate the median and semi-interquartile range of these scores.</p> <p>(b) draw a box-plot to represent this data</p>

9.

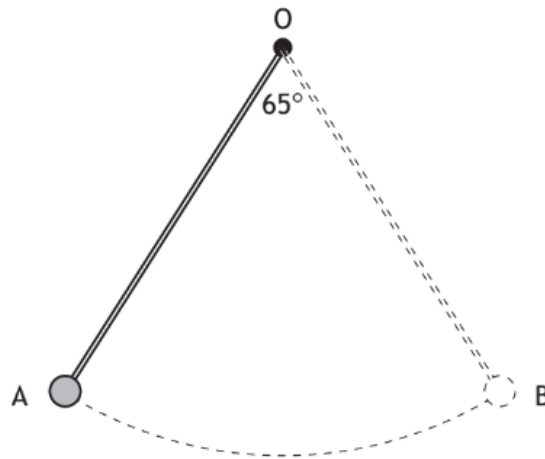
Simplify $\frac{n^5 \times 10n}{2n^2}$.

10

Express $\frac{3}{a^2} - \frac{2}{a}$, $a \neq 0$, as a single fraction in its simplest form.

11

The pendulum of a clock swings along an arc of a circle, centre O.



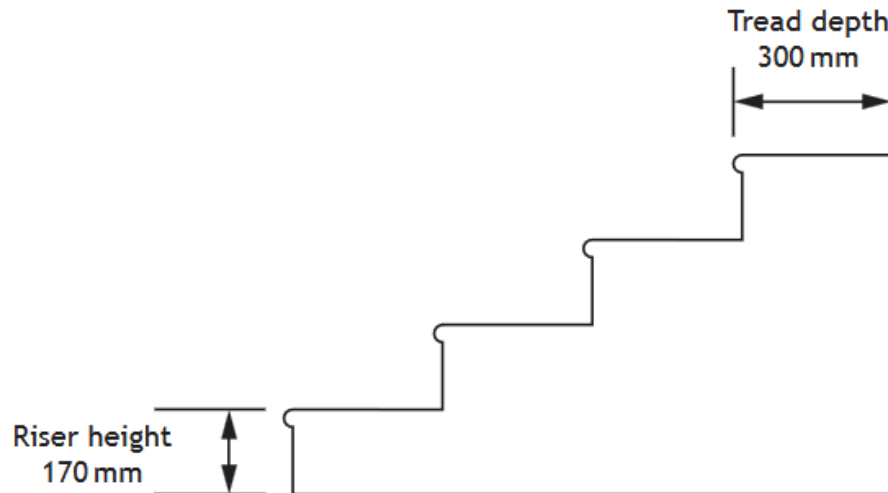
The pendulum swings through an angle of 65° , travelling from A to B.

The length of the arc AB is 28.4 centimetres.

Calculate the length of the pendulum.

12

The diagram below shows a staircase Mark intends to install in his home. The dimensions of the riser and tread of each step are shown.



For safety reasons, these rules must be applied.

- Twice the riser height plus the tread depth should be $625 \text{ mm} \pm 15 \text{ mm}$.
- The gradient of each step should be less than $\frac{1}{2}$.

Mark thinks that this staircase will meet both of these rules.

Is Mark correct?

Use your working to justify your answer.

SOLUTIONS:

1. $(x - 7)^2 - 5$
2. $x^3 - 3x^2 - 6x + 8$
3. 590 pupils
4. Cylinder = 26,238.58..cm³ hemisphere = 3619.1..cm³
Total = 29857.6...cm³ = 29900cm³ (3 sig figs)
5. a) $(2x + 5)(2x - 5)$ b) $\frac{x+5}{x+2}$
6. $x > -5$
7. a) 56.5 b) 2.42 c) No, standard deviation is greater
8. median = 19.5, SIQR = 4.5 (IQR = 9)
9. $5n^4$
10. $\frac{3-2a}{a^2}$
11. 24.68cm
12. First condition is met as $2 \times 170 + 300 = 640$ which is within tolerance (610mm – 640mm)
Second condition is not met as gradient is $\frac{17}{30}$ which is greater than $\frac{1}{2}$ (0.5666....is greater than 0.5)