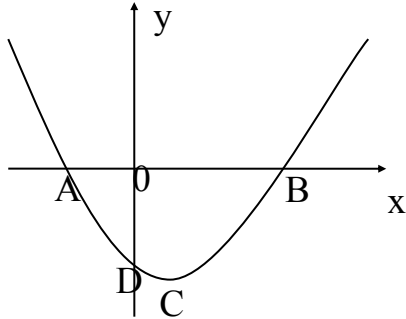# National 5
Prelim Revision

1. Solve the quadratic equation $2x^2 - 6x + 1 = 0$, giving your answers correct to 2 decimal places.

2.

The diagram shows the graph of the quadratic $y = x^2 - 6x - 7$.

The graph cuts the x axis at points A and B and the y axis at point D. $(x^3y^2)^5$
The quadratic has a minimum turning point at C.
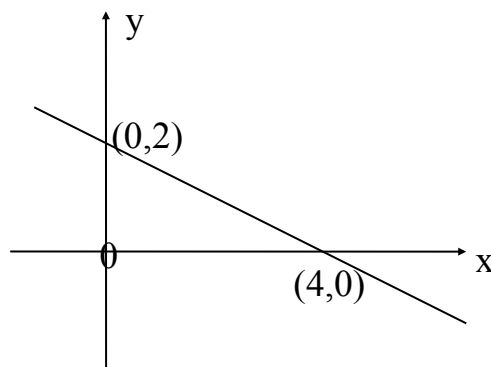Determine the coordinates of points A, B, C and D.

3. Simplify the following   a) $(3x^2)^4$ b) $5x^3 \times 8x^4$ c) $\dfrac{12y^2}{5y^4}$ d) $(x^3y^2)^5$

4. Factorise and solve   a) $3x^2 + 7x = 0$ b) $3x^2 - 4x + 1 = 0$

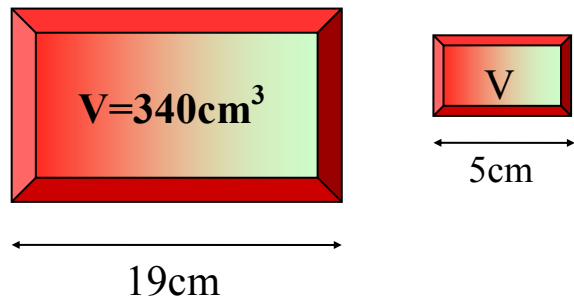5. If $f(x) = 8^x$ evaluate   a) $f(0)$ b) $f(\frac{2}{3})$ c) $f(-2)$

6. Find the values of x which satisfy $3x + 1 \geq x - 3$, where x is a whole number.

7. Find the equation of the straight line shown in the diagram.

8. A function $f(x) = 2x^2 - 5$.
   Find the values of   a) f(10)   b) f(-2)
   If f(t) = 25, find the value of t.
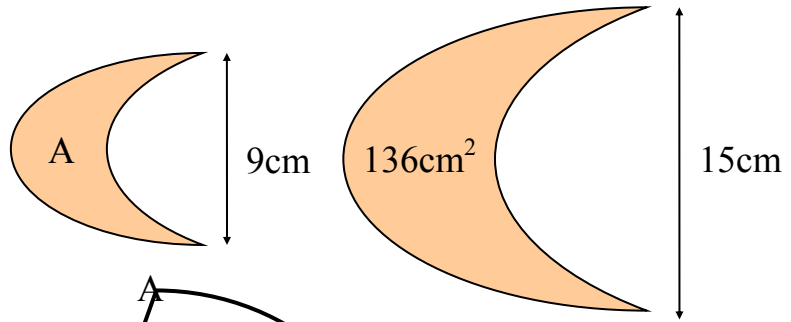
9. The two bevel shapes shown are similar.
   Calculate the volume of the smaller shape.
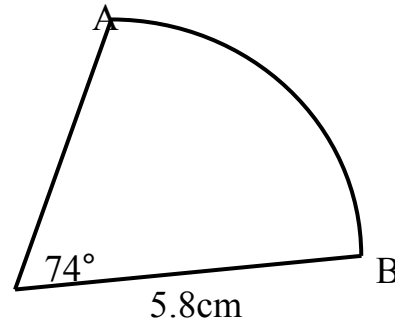
V=340cm³

V

5cm

19cm

10. Write as a single fraction

$$\frac{2x + 1}{3} - \frac{x - 1}{4}$$

11. The shapes shown are similar. Find area A.

A   9cm   136cm²   15cm
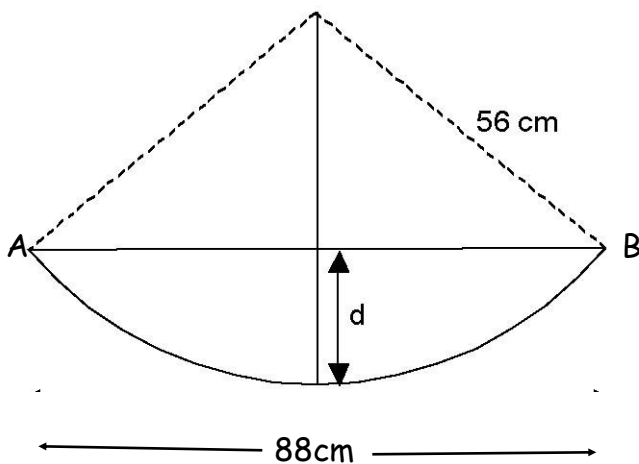
12. The diagram shows an arc AB
    of a circle of radius 5.8cm.
    The angle subtended at the centre of the
    circle by the arc is 74°. Find

    (a) The length of arc AB.
    (b) The area of the sector.

A

74°
5.8cm
B

13. The storage barn is a cylinder with
    A hemisphere on top.

    Calculate the volume of the barn.

8.5m

9.4m

56 cm

A   B

d
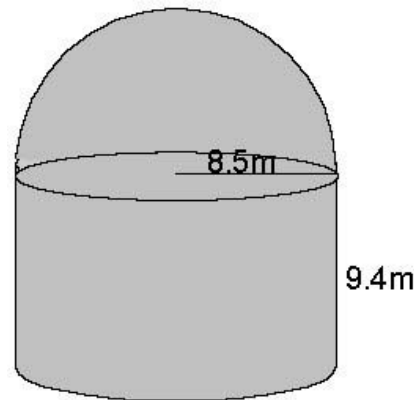
88cm

14. The diagram shows the sector of a
    Circle, radius 56cm.
    AB is a chord of length 88cm.

    Calculate the distance, dcm.

14. Express the algebraic fraction in its simplest form.

$$\frac{x^2 - 9}{3x^2 - 7x - 6}$$

15. Simplify $\sqrt{75} + \sqrt{48} - \sqrt{108}$.

16. Calculate the gradient of the line joining the points A(-1,-1) and B(-7,2).

17. Solve the equation $x(x - 1) = 5$ giving your answers correct to 1 decimal place.

18. If P=4(L + B), change the subject of the formula to L and hence find L when P = 68 and B = 6.5.

19. A satellite completes an orbit of length 2.6×10^4 miles in 9.2×10^{-1} hours. Calculate the average speed of the satellite giving your answer correct to 2 significant figures and in scientific notation.

20. Remove the brackets and simplify (2x+1)(x-3)(x-4).

21. Write in its simplest form as a surd with a rational denominator.

$$\frac{6}{\sqrt{18}}$$

22. Solve the simultaneous equations
$$4x - 3y = 11$$
$$y = x - 2$$

23. Twelve expensive flower bulbs and eight cheap ones cost £22.80.
Nine of the expensive ones and four of the cheap ones cost £15.90.
Find the price of each kind of bulb.

24. Find the nature of the roots of the following:

(a) $x^2 + 6x + 9 = 0$ (b) $x^2 - 12x + 36 = 0$ (c) $3x^2 - 7x + 5 = 0$

1. 2.82 or 0.18   2. $A(-1, 0)$, $B(7, 0)$, $C(3, -16)$, $D(0, -7)$

3. (a) $81x^8$ (b) $40x^7$ (c) $12/5y^2$ (d) $x^{15}y^{10}$

4. $x = 0$ or $x = -7/3$ (b) $x = 1/3$ 5. (a) 1 (b) 4   (c) 1/64

6. $x \geq -2$ 7. $y = -\frac{1}{2}x + 2$ 8. (a) 195 (b) 3 (c) $\pm\sqrt{15}$

9. 6.2 cm^3 10. $\dfrac{5x - 1}{12}$ 11. 48.96m^2 12. (a) 7.5 cm   (b) 21.7cm^2

13. 3419.83 cm^3 14. 21.4 cm   15. $3\sqrt{3}$ 16. $-\frac{1}{2}$

17. 2.8, -1.8   18. $L = \dfrac{P - 4B}{4}$, 10.5

19. 2.8×10^4 20. $2x^3 - 13x^2 + 17x + 12$ 21. $\sqrt{2}$

22. $x = 17/7$, $y = 3/7$

23. Expensive £1.50, cheap £0.60

24. (a) Equal roots   (b) Equal roots   (c) No real roots