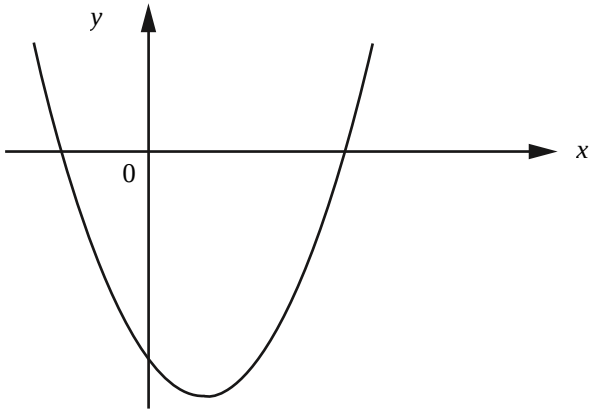
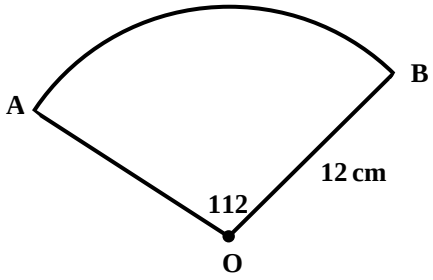
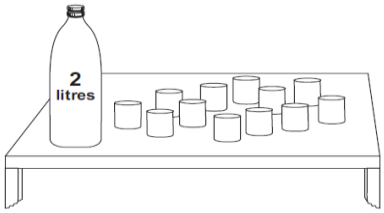
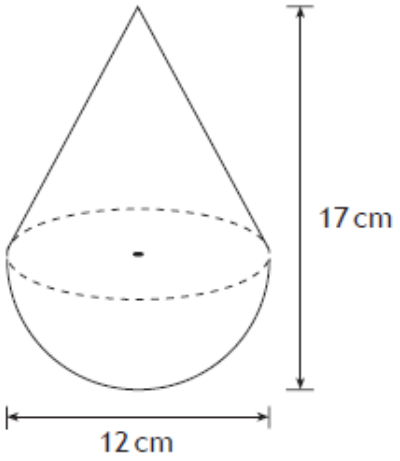
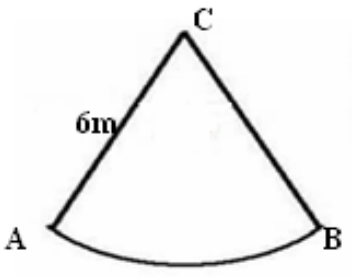
	S4 Nat 5 November Prelim Paper A – Non-Calculator	**20**
1.	Express $x^2 - 10x + 6$ in the form $(x + a)^2 + b$	**2**
2.	Simplify $\dfrac{8p^6}{2p \times p^3}$	**3**
3.	A function is given as $f(x) = 3x + 4$. Find (a) $f(2)$ (b) x when $f(x) = 25$.	**3**
4.	Solve, **algebraically**, the system of equations $8x + 3y = 0$ $3x + y = 1$	**3**
5.	Express $\sqrt{20} + 5\sqrt{5} - \sqrt{45}$ as a surd in its simplest form	**3**
6.	(a) Factorise $x^2 - 4x - 21$ (b) Hence find the roots of the equation $x^2 - 4x - 21 = 0$ (c) The graph of $y = x^2 - 4x - 21$ is shown in the diagram.  Find the coordinates of the y-intercept and the turning point for this graph	**2** **1** **3**

	S4 Nat 5 November Prelim Paper A – Calculator	**30**
1.	The diagram below shows a sector of a circle, centre O. Angle AOB $= 112°$ and the radius is 12 cm.  Calculate the area of sector AOB	**3**
2.	Lemonade is to be poured from a 2 litre bottle into glasses. Each glass is in the shape of a cylinder of radius 3 cm and height 8 cm. How many full glasses can be poured from the bottle?  	**3**
3.	The Blackbird is a two-seater high speed jet. In December 1964 it broke a world speed record by travelling at $1{\cdot}02 \times 10^4$ metres per second. Calculate, correct to three significant figures, the distance travelled if the jet were to maintain this speed for one hour. Express your answer in scientific notation.	**3**
4.	Solve the quadratic equation $x^2 - 4x - 6 = 0$ Give your answers **correct to 1 decimal place**.	**3**

5.	A child's toy is in the shape of a hemisphere with a cone on top, as shown here. The toy is 12 centimetres wide and 17 centimetres high. Calculate the volume of the toy. Give your answer correct to 2 significant figures.  	**5**
5.	Express $\frac{2}{x-3} - \frac{3}{x}$ as a single fraction.	**3**
6.	A straight line is represented by the equation $3y + 2x = 12$ **(a)** Find the gradient of this line. **(b)** Find the coordinates of the point where the line crosses the y – axis?	**2** **1**
7.	Change the subject of the formula: $V = \frac{1}{3}\pi r^2 h$ to h	**3**
6.	The boat on a carnival ride travels along an arc of a circle, centre C.  The boat is attached to C by a rod which is 6 metres long. The rod swings from position CA to position CB. The length of the arc AB is **8** metres. Find the angle through which the rod swings from position A to position B	**4**

Answers

Paper 1	Paper 2
1. **$(x-5)^2 - 19$**	1 $Area = \frac{112}{360} \times \pi \times 12^2 = 140.7\,cm^2$
2. $\frac{8p^6}{2p^4} = 4p^2$	2. Volume of glass is π x 3^2 x 8 = 226 cm^3 Volume of bottle is 2000 cm^3 2000 ÷ 226 = 8.849.., **8 full glasses**
3. (a) $f(2) = 10$ (b) $25 = 3x + 4$, $21 = 3x$, **$x = 7$**	3. 1.02 x 10^4 x 60 x 60 = 36720000 metres per hour Distance is 3.672 x 10^7 metres or 3.672 x 10^4 km
4. $8x + 3y = 0$ $9x + 3y = 3$ **$x = 3$, $y = -8$**	4 Using the quadratic formula $a = 1$, $b = -4$, $c = -6$ discriminant is $(-4)^2 - 4(1)(-6) = 40$ $x = \frac{4 \pm \sqrt{40}}{2}$, x = -1.162277.. x = 5.162277 … Answers are **x = 5.2 and x = -1.2**
5. $\sqrt{4}\sqrt{5} + 5\sqrt{5} - \sqrt{9}\sqrt{5}$ $= 2\sqrt{5} + 5\sqrt{5} - 3\sqrt{5}$ $= 4\sqrt{5}$	$Cone = \frac{1}{3}\pi \times 6^2 \times 11 = 414.69023..$ 5. $Hemisphere = \frac{2}{3}\pi \times 6^3 = 452.389...$ $Shape = 867.07923 = 870\,cm^3$
6. (a) $(x - 7)(x + 3)$ (b) $x = 7$ and $x = -3$ (c) (0, -21) and (2, -25)	6. $y = -2/3x + 4$ Gradient is m = -2/3 y-intercept (0,4)
	7. $h = \frac{3V}{\pi r^2}$
	8. $Angle = \frac{360 \times 8}{\pi \times 12} = 76.4^0$