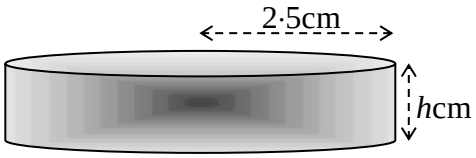
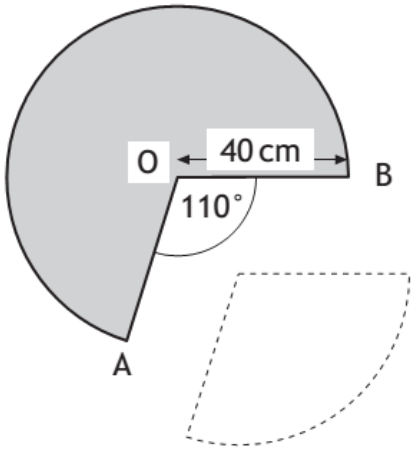
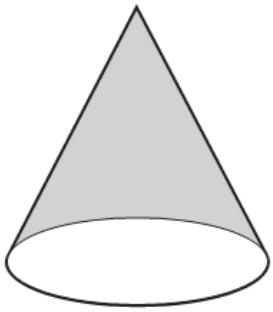
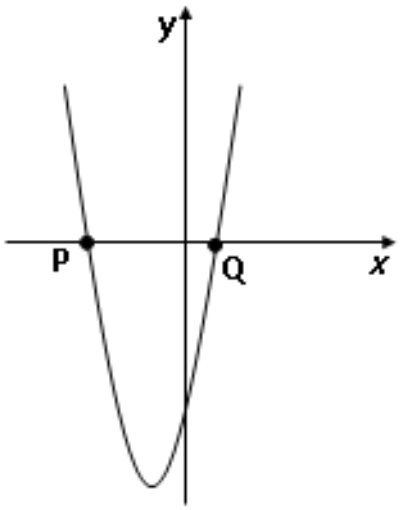
	S4 Nat 5 November Prelim Paper B – Non-Calculator	**20**
1.	Express $x^2 + 6x - 5$ in the form $(x + p)^2 + q$	**2**
2.	Multiply out the brackets and collect like terms $(4x - 5)(2x + 3) + 8x$	**3**
3.	Express this fraction with a rational denominator $\dfrac{5}{2\sqrt{3}}$	**2**
4.	(a) Find the equation of the line joining points (2,3) and (5, 9) (b) Find the coordinates of the point where this line crosses the (i) the y-axis (ii) the x-axis	**3** **1** **2**
5.	Write in its simplest form (a) $\sqrt{18} \div \sqrt{2}$ (b) $\dfrac{a^5 \times a^3}{a^4}$	**4**
6.	Write as a single fraction in its simplest form $\dfrac{3a}{5x} \div \dfrac{a}{x^2}$	**3**

	S4 Nat 5 November Prelim Paper B – Calculator	**30**
1.	Factorise $2x^2 - x - 6$	**2**
2.	The diameter of an ordinary snooker ball is 5·25cm. (a) Calculate the volume of a snooker ball giving your answer correct to **3 significant figures.** (b) On board a ship the game of snooker is played with coloured discs instead of balls in case the sea is rough.  The volume of each disc is equal to the volume of a snooker ball. If the disc has radius 2·5cm, calculate the **height** of it.	**4** **3**
3.	A cone is formed from a paper circle with a piece removed   Calculate the (a) The area of card used to make the cone (b) The circumference of the base of the cone	 **3** **2**

4.	Determine the nature of the roots of the quadratic equation $9x^2 - 6x + 1 = 0$	**2**
5.	Change the subject of the formula $4\sqrt{b - d} = c$ to 'b'	**3**
6.	For one of their performances a drama group charges different ticket prices for each evening. (a) Sam bought 3 tickets for Friday and 4 tickets for Saturday which cost him £57. Using x to represent the Friday tickets and y to represent the Saturday tickets, write an equation to illustrate the above situation. (b) Sara bought 4 tickets for Friday and 2 for Saturday. She was charged £46. Write another equation in x and y to illustrate this situation. (c) How much does a ticket cost for each night?	**1** **1** **4**
7.	The parabola in the diagram has The equation $y = 3x^2 + 4x - 2$. The parabola cuts the x-axis at **P** and **Q**. Find the coordinates of **P** and **Q** Giving you answers correct to **1 decimal place.** 	**5**

Answers

Paper 1	Paper 2
1. **$(x-3)^2 - 14$**	1 $(2x+3)(x-2)$
2. $8x^2 + 12x - 10x - 15 + 8x$ $= 8x^2 + 2x - 15 + 8x$ $=$ **$8x^2 + 10x - 15$**	2. $V = \frac{4}{3} \times \pi \times 2.625^3 = 75.766379... = 75.8\,cm^3$ (b) $75.8 = \pi \times 2.5^2 \times h \rightarrow \; h = \frac{75.8}{6.25\pi} \rightarrow h = 3.86\,cm$
3. $\frac{5}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{5\sqrt{3}}{6}$	$Area = \frac{250}{360} \times \pi \times 40^2 = 3490.66\,cm^2$ 3. $Circumference = \frac{250}{360} \times \pi \times 80 = 174.5\,cm$
4. (a) **$y = 2x - 1$** (b)(i) **(0,-1)** (ii) $0 = 2x - 1$ $½ =$ **x** **(½ , 0)**	4. $b^2 - 4ac = (-6)^2 - 4(9)(1)$ $b^2 - 4ac = 0$ quadratic equation has **two real equal roots**
5. (a) $\frac{\sqrt{18}}{\sqrt{2}} = \sqrt{9} = 3$ (b) $\frac{a^8}{a^4} = a^4$	$4\sqrt{b} = c + d$ 5. $\rightarrow \quad \sqrt{b} = \frac{c+d}{4}$ $\rightarrow \quad b = \left(\frac{c+d}{4}\right)^2$
6. $\frac{3a}{5x} \times \frac{x^2}{a} = \frac{3x}{5}$	6. (a) 3f +4s = 57 (b) 4f + 2s = 46 (c) 3f + 4s = 57 8f + 4s = 92 5f = 35, **f = 7 and s = 9** **Tickets for Friday are £7.00** **Tickets for Saturday are £9.00**
	7. Using the quadratic formula $a = 3,\ b = 4,\ c = -2$ discriminant is $(4)^2 - 4(3)(-2) = 40$ $x = \frac{-4 \pm \sqrt{40}}{2(3)}$, $x = -1.72075..$ $x = 0.3874\ldots$ **P is (-1.7, 0) and Q is (0.4, 0)**