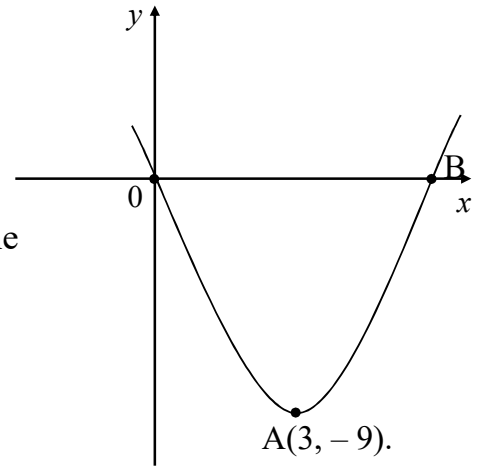
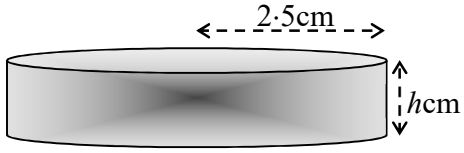
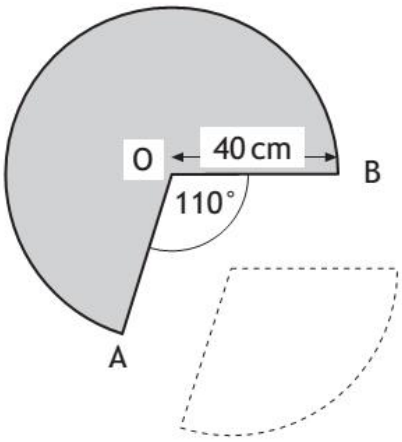
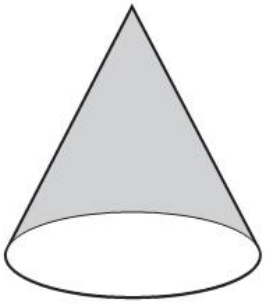
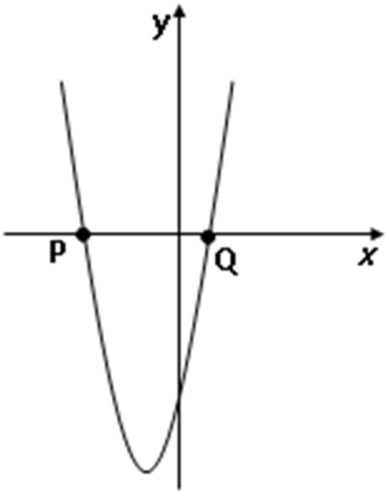
| | **Nat 5 Prelim 2 – Non-Calculator** | **20** |
|---|---|---|
| **1.** | Evaluate $2\frac{3}{5}\times\frac{2}{7}$ | **2** |
| **2.** | The standard deviation of 1,2,2,2,8 is equal to $\sqrt{a}$<br>Find the value of a | **3** |
| **3.** | The population of a village fell by 20% in one year. If there are now 240000 people in the town, what was the population last year | **3** |
| **4** | Express this fraction with a rational denominator $\frac{5}{2\sqrt{3}}$ | **2** |
| **5.** | Find the equation of the line joining points (2,4) and (6, 10)<br><br>Find the coordinates of the point where this line crosses the x-axis | **3**<br><br>**2** |
| **6.** | The diagram shows part of the graph of the parabola which has a minimum turning point at (3, – 9).<br><br>**(a)** Write down the equation of the parabola in the form $y=(x-a)^2+b$<br><br>The parabola cuts the $x$ - axis at the origin and the point B.<br><br>**(b)** What is the length of OB? |  <br><br>**2**<br><br>**3** |

| | Nat 5 Prelim Revision – Calculator | **30** |
|---|---|---|
| 1. | Membership of a health club has been increasing at the rate of 12% per annum.<br>The present membership is 2580. If it continues to increase at this rate, what will the membership be in 4 years time?<br>Give your answer correct to **3 significant figures.** | **4** |
| 2. | The capacities (to the nearest 1000) of the six largest football stadiums in Scotland are:<br><br>61 51 50 23 19 18<br><br>**(a)** Calculate the mean and standard deviation of this data.<br><br>**(b)** The mean capacity for the six largest stadiums in England is 63·8 thousand with a standard deviation 16·4.<br>Compare the capacities of stadiums in England with those in Scotland. | **4**<br><br>**2** |
| 3. | The diameter of an ordinary snooker ball is 5·25cm.<br><br>(a) Calculate the volume of a snooker ball giving your answer correct to **3 significant figures.**<br><br>(b) On board a ship the game of snooker is played with coloured discs instead of balls in case the sea is rough.<br><br>  <br><br><br>The volume of each disc is half the volume of a snooker ball.<br>If the disc has radius 2·5cm, calculate the **height** of it. | **4**<br><br>**3** |
| 4. | Determine the nature of the roots of the quadratic equation<br>$9x^2 - 6x + 1 = 0$ | **2** |

| | | |
|---|---|---|
| 5. | A cone is formed from a paper circle with a piece removed<br>  <br><br>  <br>Calculate the<br>(a) The area of card used to make the cone<br>(b) The circumference of the base of the cone | **3**<br>**2** |
| 6. | The parabola in the diagram has The equation $y = 3x^2 + 4x - 2$.<br>The parabola cuts the $x$-axis at **P** and **Q**.<br>Find the coordinates of **P** and **Q** Giving you answers correct to **1 decimal place.**<br>  <br> | **6** |

## Answers

| Paper 1 | Paper 2 |
|---|---|
| 1. $\frac{13}{5}\times\frac{2}{7}=\frac{26}{35}$ | 1 $2580 \times 1.12^4 = 4059.679949$<br>Membership is 4060 |
| 2. mean is 3, $(x+\bar{x})^2=32$<br>S = $\sqrt{a}=\sqrt{\frac{32}{4}}$ a = 8 | 2. (a) mean is 37,<br>Using the first formula<br>$(x-\bar{x})^2=1822$, s = $\sqrt{\frac{1822}{5}}=19.09$<br>Using the second formula<br>$\sum x=222, \sum x^2=10036$,<br>s = $\sqrt{\frac{10036-(222^2)/6}{5}}=19.09$<br>(b) In England the stadium capacities are larger overall (higher mean) and more consistent (lower standard deviation) |
| 3. 80% = 240 000<br>10% = 30 000<br>100% = 300 000 | 3. $V=\frac{4}{3}\times\pi\times2.625^3=75.766379...=75.8\,cm^3$<br>(b)<br>$\frac{75.8}{2}=\pi\times2.5^2\times h \rightarrow h=\frac{37.9}{6.25\pi}\rightarrow h=1.93\,cm$ |
| 4. $\frac{5}{2\sqrt{3}}\times\frac{\sqrt{3}}{\sqrt{3}}=\frac{5\sqrt{3}}{6}$ | 4. $b^2 - 4ac = (-6)^2 - 4(9)(1)$<br>$b^2 - 4ac = 0$<br>quadratic equation has two real equal roots |
| 5. $y=\frac{3}{2}x+1$<br>$0=\frac{3}{2}x+1$, $x=\frac{-2}{3}$, $\left(\frac{-2}{3},0\right)$ | 5. $Area=\frac{250}{360}\times\pi\times40^2=3490.66\,cm^2$<br>$Circumference=\frac{250}{360}\times\pi\times80=174.5\,cm$ |
| 6. y = $(x - 3)^2 - 9$<br><br>The axis of symmetry is $x = 3$<br>From the origin to the axis of symmetry is 3 units,<br>therefore OB is 6 units<br><br>If you expand the completed square<br>$y = x^2 - 6x$<br>roots are $x(x – 6) = 0$, $x = 0$ and $x = 6$<br>OB is 6 units | 6. Using the quadratic formula<br>$a = 3$, $b = 4$, $c = -2$<br>discriminant is $(4)^2 - 4(3)(-2) = 40$<br>$x=\frac{-4\pm\sqrt{40}}{2(3)}$, $x$ = -1.72075.. $x = 0.3874\ldots$<br><br>P is (-1.7, 0) and Q is (0.4, 0) |

**Extra Practice 4**

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|---|---|---|---|---|---|
| 1. | Fractions | Page 342 Q1 | 1. | Percentage inc/dec | Page 331 Q10 |
| 2. | Standard Deviation | | 2. | Standard Deviation | Page 350 Q5 |
| 3. | Reverse Percentages | Page 337 Q1,2 | 3. | Volume | Page 78 Q4 |
| 4. | Surds | Page 10 Q2 | 4. | Discriminant | Page 201 Q1 |
| 5. | Straight lines | Page 102 Q3 | 5. | Arcs and Sectors | Page 77 Q6,7 |
| 6. | Quadratic Graphs | Page 156 Q2 | 6. | Quadratic Formula | Page 188 Q2 |