Exercise 1 Calc. : ✗

Simplify the following expressions:	8 marks

a) $5x^3y^2 \times 3x^4y^3$ b) $\dfrac{20p^4q^5}{4pq^2}$ c) $\dfrac{a^2}{a\sqrt{a}}$ d) $\left(x^2y^4\right)^{-\frac{1}{2}}$

Exercise 2 Calc. : ✗

Given that $p = 6.5 \times 10^6$, $q = 5 \times 10^{-4}$ and $r = 1.8 \times 10^3$, **evaluate** the following:	8 marks

a) pq b) $\dfrac{p}{q}$ c) q^2r

Exercise 3 Calc. : ✗

Solve the following equations:	8 marks

a) $x^2 - 6x + 5 = 0$ b) $x^2 + 2x - 2 = 0$ c) $2x^2 - x - 6 = 0$
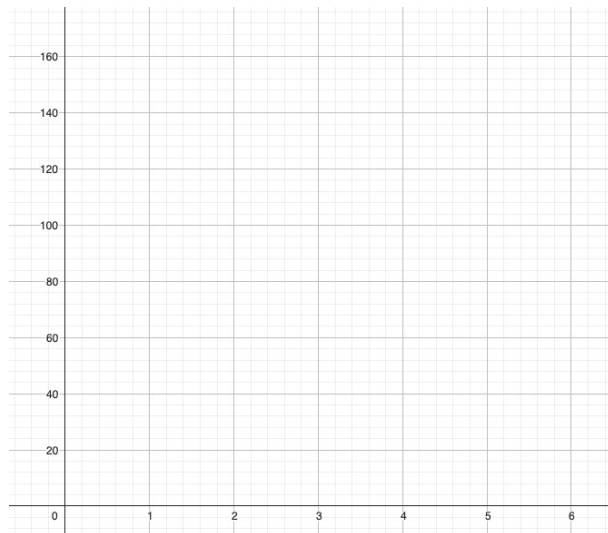
Exercise 4 Calc. : ✗

The number of plastic bottles found in a lake each month can be modelled by the formula

$$n = 10 \times 2^t$$

where t is the time in months.

a) **Determine** how many plastic bottles was found initially. 1 mark

b) **Complete** the table 2 marks

Months (t)	0	1	2	3	4
Number of bottles (n)					

c) Use the diagram below to **plot** a graph showing the relationship between n and t. 2 marks

d) **Determine** the type of function for the graph. 1 mark

e) Use your graph to **estimate** how many bottles were found after 3.5 months. 1 mark

f) **Comment**: will this formula always give an accurate account of the number of bottles in the lake? 1 mark

Exercise 5   Calc. : ✗

Complete the table showing the exact values for the following trigonometric functions						6 marks
Angle θ	0°	30°	45°	60°	90°	
$\sin(\theta)$				$\dfrac{\sqrt{3}}{2}$	1	
$\cos(\theta)$	1					
$\tan(\theta)$			1			

Exercise 6   Calc. : ✗

Isolate x in the following expressions   7 marks

a) $-z + y - x = 25$ 　　　　　　 b) $-9x - p^2 = -27p$ 　　　　　 c) $3 = \dfrac{y - z}{\sqrt{x}}$

Exercise 7   Calc. : ✗

Two vectors $\overrightarrow{p}$ and $\overrightarrow{q}$ are shown on the grid.

a) **Write** any position vector that is equal to $\overrightarrow{p} - 2\overrightarrow{q}$.   1 mark

b) **Write** any position vector that is equal to $-2\overrightarrow{p} - \overrightarrow{q}$.   1 mark

c) By drawing on the grid, **show** that   3 marks

$$(\overrightarrow{p} - 2\overrightarrow{q}) + (-2\overrightarrow{p} - \overrightarrow{q}) = -\overrightarrow{p} - 3\overrightarrow{q}$$

d) **Find** the value of c and d: 3 marks

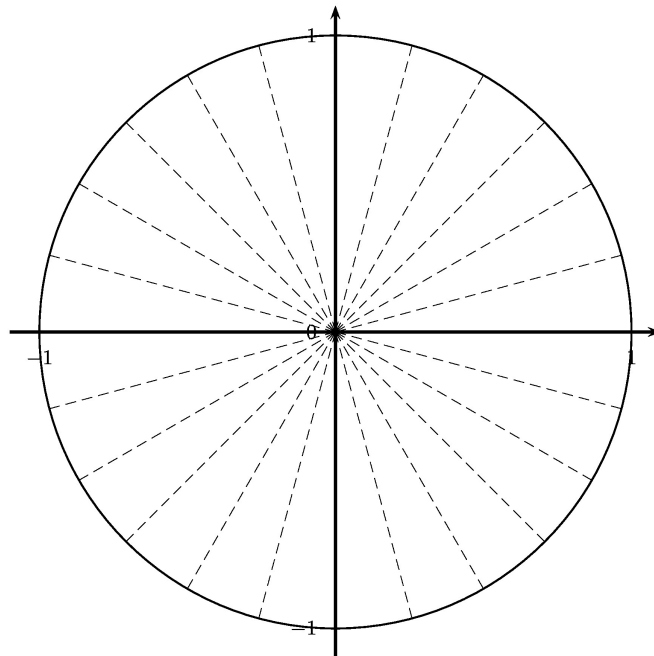$$\binom{c}{5} + 2\binom{3}{d} = \binom{d}{8}$$

Exercise 8

a) **Convert** the following degrees to radians

3 marks

$$45°, \quad 225°, \quad 720°, \quad 30°$$

b) **Draw** the angles from above in the unit circle

3 marks

Exercise 9

The depth of water, d metres, in a harbour at a time, t hours after midnight, is given by
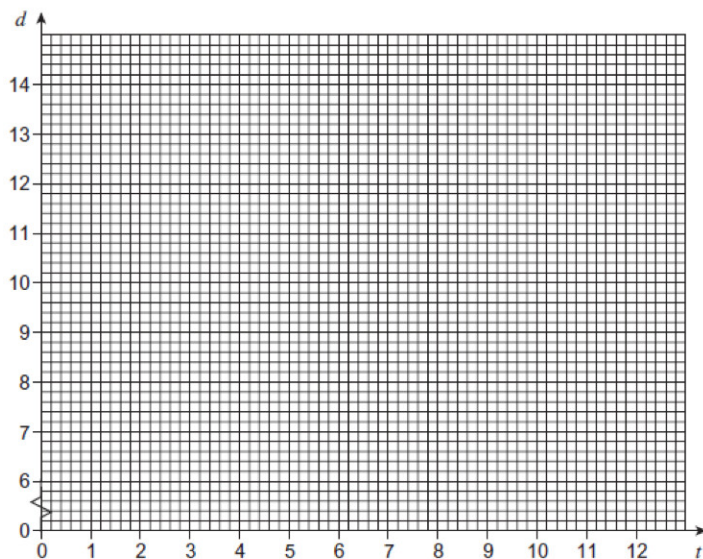
$$d = 4\cos\left(\frac{\pi}{6}t + \pi\right) + 10$$

a) **Fill out** the missing values in the table below — 3 marks

t	0	1	2	3	4	5	6	7	8	9	10	11	12
d	6	6.5	8	10	12	13.5		13.5	12	10		6.5	

b) On the grid below, **draw** the graph of $d = 4\cos\left(\frac{\pi}{6}t + \pi\right) + 10$ — 2 marks

c) The depth of water must be at least 9 metres for a ship to enter the harbour. At midnight a ship is waiting to enter the harbour.

Use the graph to **estimate** the earliest time the ship can enter. — 3 marks