

NS Practice Prelim B - Paper 1

1)

$\pounds 158\,000\,000\,000$

- Round correctly

Strategy:

Look at 5th digit from left; if it is 5 or bigger, round up the 4th digit by 1.

2) (a)

Mark	Frequency	Cumulative Frequency
5	2	2
6	5	7
7	6	13
8	11	24
9	9	33
10	2	35

Strategy:

Cum. freq. is a running total of the frequencies.

- Table with correct cumulative frequency column

(b) (i)

$\text{Median} = 8$

- Obtain median

Strategy:

Median is 'middle' number; in this case, the 18th number.

(ii)

$Q_1 = 7$

- Obtain Q_1

(iii)

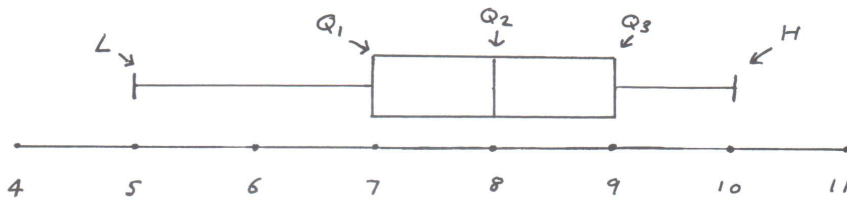
$Q_3 = 9$

- Obtain Q_3

Strategy:

Q_1 is median of lower data set; Q_3 is median of upper data set.

(c)



- Correct L and H
- Correct Q_1 , Q_2 and Q_3

Strategy:

Know how to plot a boxplot.

3)

(a) $4x + 3y = 36$

$\therefore 4(0) + 3y = 36$

$\Rightarrow 3y = 36$

$\Rightarrow \underline{y = 12}$

$\therefore \boxed{A(0, 12)}$ • State coordinates of A

Strategy:

Substitute $x = 0$ into straight line equation.

(b) $4x + 3y = 36$

$\therefore 4x + 3(8) = 36$

$\Rightarrow 4x + 24 = 36$

$\Rightarrow 4x = 12$

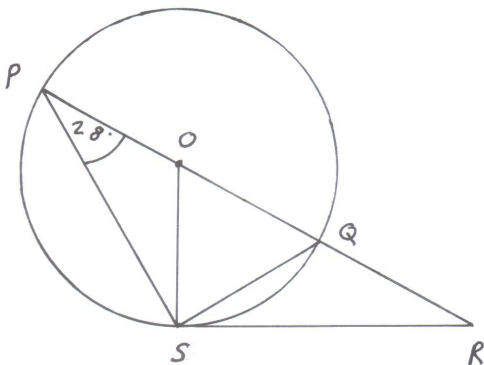
$\Rightarrow \underline{x = 3}$

$\therefore \boxed{C(3, 8)}$ • Substitute value into equation
• State coordinates of C

Strategy:

Substitute $y = 8$ into straight line equation.

4)



Strategy:

OP and OS are radii;
 hence $\triangle OPS$ is equilateral. $\triangle PQS$ is a
 triangle inside a semi-
 circle $\Rightarrow \widehat{PSQ} = 90^\circ$.
 SR is a tangent to OS
 $\Rightarrow \widehat{OSR} = 90^\circ$. Then
 $\widehat{PRS} = 180^\circ - \widehat{OPS} - \widehat{PSR}$.

$\triangle OPS$ is isosceles $\Rightarrow \widehat{PSO} = 28^\circ$

SR is tangent to $OS \Rightarrow \widehat{OSR} = 90^\circ$
 • Obtain $\widehat{OSR} = 90^\circ$

$$\widehat{PSR} = \widehat{PSO} + \widehat{OSR}$$

$$\therefore \widehat{PSR} = 28^\circ + 90^\circ$$

$$\Rightarrow \underline{\widehat{PSR} = 118^\circ} \quad \bullet \text{ Obtain } \widehat{PSR}$$

$$\widehat{PRS} = 180^\circ - 28^\circ - 118^\circ$$

$$\therefore \widehat{PRS} = 180^\circ - 146^\circ$$

$$\Rightarrow \underline{\widehat{PRS} = 34^\circ}$$

$$\widehat{QRS} = \widehat{PRS} \Rightarrow \boxed{\widehat{QRS} = 34^\circ} \quad \bullet \text{ Obtain } \widehat{QRS}$$

$$5) \quad 2x^2 + px + 6 = 0$$

$$D = b^2 - 4ac$$

$$(a = 2, b = p, c = +6)$$

• Use of discriminant

$$\therefore D = p^2 - 4(2)(+6)$$

$$\Rightarrow D = p^2 - 8(+6)$$

$$\Rightarrow \underline{D = p^2 - 48} \quad \bullet \text{ Obtain discriminant}$$

For equal roots $D = 0$. So,

$$p^2 - 48 = 0 \quad \bullet \text{ Use } D = 0$$

$$\therefore p^2 = 48$$

$$\Rightarrow p = \pm \sqrt{48}$$

$$\Rightarrow p = \pm \sqrt{16 \cdot 3}$$

$$\Rightarrow \boxed{p = \pm 4\sqrt{3}} \quad \bullet \text{ Solve and simplify fully}$$

(* Mistake in original question ($c = 6$, not -6))

Strategy:

Calculate discriminant;
equate discriminant to 0
(as equal roots) and solve
for p . Simplify answers!
fully.

6) (a) $x^2 - 6x + 8 = 0$
 $(x-2)(x-4) = 0$

$\therefore x = 2, x = 4$

- Write down roots

Strategy:

Roots obtained by putting factorised quadratic = 0.

(b) $A(0, 8)$

$B(2, 0)$

$C(4, 0)$

- State coordinates of A
- State coordinates of B
- State coordinates of C

Strategy:

On y-axis, $x = 0$; this gives A. B and C are obtained by putting $y = 0$; already done in (a).

(c) $B(2, 0), C(4, 0)$

$\frac{2+4}{2} = \frac{6}{2} = 3$

\therefore Symmetry axis equation is $x = 3$

Strategy:

Symmetry axis equation obtained by halfway point between B and C.

- State symmetry axis equation

(d) $y = 3^2 - 6(3) + 8$

$\therefore y = 9 - 18 + 8$

$\Rightarrow y = -1$ • Obtain TP

\therefore TP at $(3, -1)$

Strategy:

Symmetry axis goes through TP; y-coordinate obtained from original quadratic.

$$7) A = \frac{1}{2} ab \sin C$$

$$(a = BC, b = 16, \sin C = \frac{1}{4})$$

$$\therefore 20 = \frac{1}{2} BC \cdot 16 \cdot \frac{1}{4}$$

• Substitute into formula

$$\Rightarrow 20 = \frac{1}{8} BC \cdot 16$$

$$\Rightarrow 2BC = 20$$

$$\Rightarrow \boxed{BC = 10 \text{ cm}} \quad \bullet \text{ obtain answer}$$

Strategy:

Use area of a triangle formula (trigonometry).

$$8) (a) a^2 + 2ab + b^2$$

$$= (a+b)(a+b)$$

$$= \boxed{(a+b)^2}$$

• Factorise

Strategy:

Factorise a quadratic trinomial with letters.

$$(b) a = 94, b = 6$$

$$a^2 + 2ab + b^2 = (a+b)^2$$

$$\therefore 94^2 + 2 \times 94 \times 6 + 6^2$$

$$= (94+6)^2 \quad \bullet \text{ Substitute values}$$

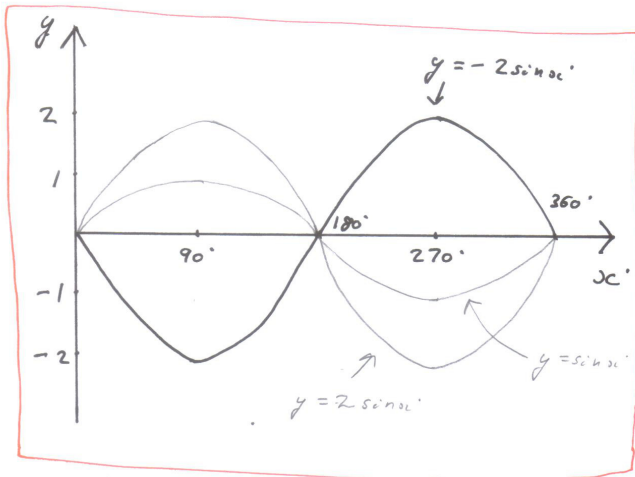
$$= 100^2$$

$$= \boxed{10000} \quad \bullet \text{ Obtain answer}$$

Strategy:

Use result from (a) and substitute in values.

9) $y = -2 \sin x$
 $(0 \leq x \leq 360)$



Strategy:

Graph of $y = -2 \sin x$ is graph of $y = \sin x$ stretched by a factor of 2 up the y-axis and reflected in the x-axis.

- Max. = 2, min. = -2
- One whole sine graph (0° → 360°)
- Reflect

10) $\sqrt{2}(\sqrt{3} + \sqrt{2}) - \sqrt{6}$
 • Expand brackets
 $= \sqrt{2}\sqrt{3} + \sqrt{2}\sqrt{2} - \sqrt{6}$
 $= \sqrt{6} + 2 - \sqrt{6}$
 $= \boxed{2}$ • Simplify fully

Strategy:

Expand brackets and simplify.

11) $x^2 - 6x + 8$
 $= (x-3)^2 - 3^2 + 8$
 $= (x-3)^2 - 9 + 8$
 $= \boxed{(x-3)^2 - 1}$

Strategy:

Complete the square.

- Obtain $a = -3$
- Obtain $b = -1$