N5 Practice Prelim A - Paper 1

1) $6ab - 7bc$

$= \boxed{b(6a - 7c)}$

• Correct factorisation

Strategy:
Take out any numbers or letters that are common to both terms.

2) $A(\overset{x_1}{0}, \overset{y_1}{4})$

$B(\underset{x_2}{3}, \underset{y_2}{0})$

$m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$\therefore m = \dfrac{0 - 4}{3 - 0}$

$\Rightarrow \underline{m = -\dfrac{4}{3}}$ • Find gradient

Strategy:
Equation of line is $y = mx + c$; get gradient (m) from 2 points on line and y-intercept (c) from diagram.

From diagram, $\underline{c = 4}$. • Obtain y-intercept

$y = mx + c$

$\therefore \boxed{y = -\dfrac{4}{3}x + 4}$ • State equation of line

3)

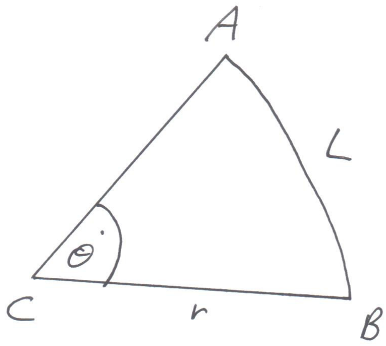
$$L = \frac{\theta^\circ}{360^\circ} \times 2\pi r$$

L = arc length AB

θ° = sector angle $= 72^\circ$

r = radius $= 5\,cm$

$\pi = 3 \cdot 14$



• Angle fraction

$$\therefore L = \frac{72^\circ}{360^\circ} \times 2 \times 3 \cdot 14 \times 5$$ • Arc length formula used

$$\Rightarrow L = \frac{1}{5} \times 2 \times 3 \cdot 14 \times 5$$

$$\Rightarrow L = 2 \times 3 \cdot 14$$

$$\Rightarrow \boxed{L = 6 \cdot 28\,cm}$$

• Obtain answer

Strategy:

As non-calculator, must find a way to simplify the calculation; simplify all fractions, look for numbers that divide exactly etc.. Here, the fraction simplifies and cancels the '5'.

4) $2x - y = 10$ ①

$4x + 5y = 6$ ②

To eliminate 'y', multiply '①' by '5':

Strategy:

Get either the 'x' or 'y' coefficients the same; then add or subtract to eliminate 1 variable. Obtain other variable by substituting back into one of the equations.

• Equations scaled correctly

$10x - 5y = 50$ ③

$4x + 5y = 6$ ②

②+③: $14x = 56$

$\therefore \quad x = 4$ • Solve for x

Substitute $x = 4$ into '①':

$2x - y = 10$

$\therefore \quad 2(4) - y = 10$

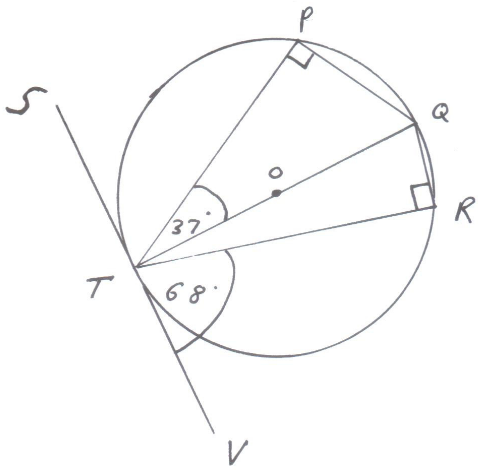
$\Rightarrow \quad 8 - y = 10$

$\Rightarrow \quad y = 8 - 10$

$\Rightarrow \quad y = -2$ • Solve for y

So, $\boxed{x = 4 \text{ and } y = -2}$.

5)



Strategy:

$P\hat{Q}R = P\hat{Q}T + T\hat{Q}R$; STV is tangent to circle at $T \Rightarrow TQ$ is at right angles to STV. TQ is a diameter means ΔTPQ is right-angled at P and ΔTRQ is right-angled at R.

• Use of $Q\hat{T}V = 90°$

$Q\hat{T}V = 90° \Rightarrow Q\hat{T}R = 22°$.

So, $T\hat{Q}R = 90° - 22° \Rightarrow \underline{T\hat{Q}R = 68°}$

• Use of $T\hat{P}Q = 90°$

$T\hat{P}Q = 90° \Rightarrow \underline{P\hat{Q}T = 53°}$

$P\hat{Q}R = P\hat{Q}T + T\hat{Q}R$

$\therefore P\hat{Q}R = 53° + 68°$

$\Rightarrow \boxed{P\hat{Q}R = 121°}$

• Obtain $P\hat{Q}R$

6) (a) (i) $\text{Median} = \frac{35+35}{2}$

$\Rightarrow \boxed{\text{Median} = 35}$

• Obtain median

Strategy:

Median is the 'middle' number; as n is even, median is average of middle 2 numbers.

(ii) $\boxed{Q_1 = 22}$

• Obtain Q_1

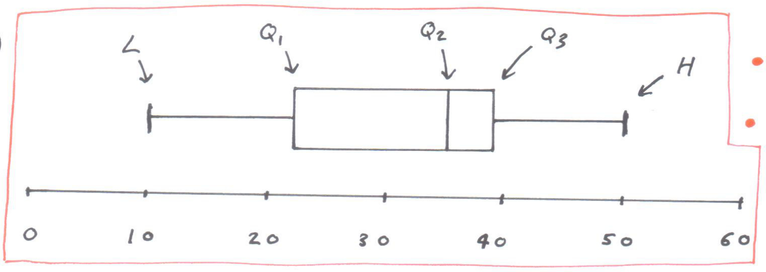
(iii) $\boxed{Q_3 = 39}$

• Obtain Q_3

Strategy:

Lower quartile (Q_1) is median of lower data set; upper quartile (Q_3) is median of upper data set.

(b)



• Correct L and H

• Correct Q_1, Q_2 and Q_3

Strategy:

Know how to plot a boxplot.

(c) Generally, the fourth years spend more time on homework.

• Comment on average times.

Strategy:

Compare medians and variation in times (i.e. the ranges).

There is less variation in the times spent on homework in fourth year than in first year.

• Comment on spread of times.

7) $$\frac{(x+4)^2}{x^2-x-20}$$

Strategy: Factorise fully top and bottom; cancel anything that is common.

$$= \frac{(x+4)^2}{(x+4)(x-5)}$$

• 1st correct factor • 2nd correct factor

$$= \boxed{\frac{x+4}{x-5}}$$

• Obtain answer

8) $y = \sin 2x°$

Strategy: Period of sine or cosine ($\sin kx°$ / $\cos kx°$) is $\frac{360°}{k}$.

$$\text{Period} = \frac{360°}{2}$$

$$\Rightarrow \boxed{\text{Period} = 180°}$$

• Obtain answer

9) $y = 20 - (x-4)^2$

Strategy: $20-(x-4)^2$ is a maximum when $(x-4)^2=0$; so, $x = 4$.

(a) Max. occurs when $x = 4$; • Obtain x

$y = 20 - 0^2 \Rightarrow y = 20$.

$\therefore$ $\boxed{\text{Max. at } (4, 20)}$

• Obtain y and coordinate stated

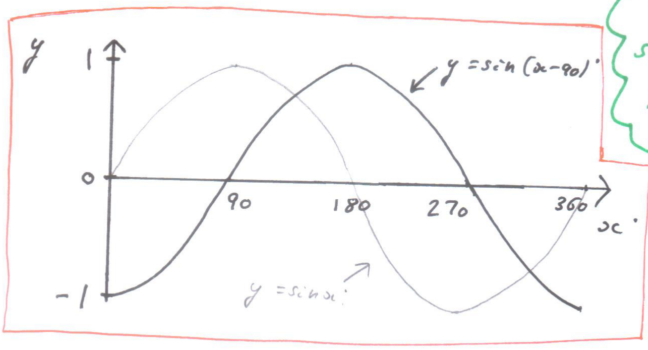
(b) $\boxed{x = 4}$

• Obtain equation

Strategy: Symmetry axis passes through max./min. coordinate; equation is $x =$ CONSTANT

10) $y = \sin(x - 90)^\circ$

$(0 \leq x \leq 360)$



Strategy:

Graph of $y = \sin(x-90)^\circ$ is graph of $y = \sin x^\circ$ shifted 90° to the right.

- Max. = 1, min. = -1
- Evidence of $90^\circ \rightarrow$ shift
- Sketch curve

11) $\underline{u} = \begin{pmatrix} 4 \\ -1 \\ 5 \end{pmatrix}, \quad \underline{v} = \begin{pmatrix} 3 \\ 3 \\ 1 \end{pmatrix}$

Strategy:

Add vectors; then use magnitude formula. Simplify surd, if possible.

$$\underline{u} + \underline{v} = \begin{pmatrix} 4 & + & 3 \\ -1 & + & 3 \\ 5 & + & 1 \end{pmatrix}$$

$$\therefore \underline{\underline{u} + \underline{v} = \begin{pmatrix} 7 \\ 2 \\ 6 \end{pmatrix}}$$ • Add vectors

$$\therefore |\underline{u} + \underline{v}| = \sqrt{7^2 + 2^2 + 6^2}$$ • Use of magnitude formula

$$\Rightarrow |\underline{u} + \underline{v}| = \sqrt{49 + 4 + 36}$$

$$\Rightarrow \boxed{|\underline{u} + \underline{v}| = \sqrt{89}}$$

• Obtain answer

(Question is only worth 3 marks, not 4)