

N5 Practice Prelim Paper A Non-Calculator

$$\begin{aligned} 1. \quad (x-2)(x^2+3x-4) &= x^3+3x^2-4x-2x^2-6x+8 \\ &= \underline{\underline{x^3+x^2-10x+8}} \end{aligned}$$

$$2. \quad a^2-9a+20 = \underline{\underline{(a-4)(a-5)}}$$

$$\begin{aligned} 3. \quad 3\frac{5}{8} + 4\frac{2}{3} &= 3\frac{15}{24} + 4\frac{16}{24} \\ &= 7\frac{31}{24} \\ &= \underline{\underline{8\frac{7}{24}}} \end{aligned}$$

$$\begin{aligned} 4. \quad 2y &< 3-(y+6) \\ 2y &< 3-y-6 \\ 2y &< -y-3 \\ 3y &< -3 \\ \underline{\underline{y < -1}} \end{aligned}$$

$$5. \quad m = \frac{3-0}{10-4} = \frac{3}{6} = \frac{1}{2}$$

$$T-3 = \frac{1}{2}(S-10)$$

$$T-3 = \frac{1}{2}S-5$$

$$\underline{\underline{T = \frac{1}{2}S-2}}$$

$$\begin{aligned} 6. \quad h(t) &= 15t-3t^2 \\ h(-2) &= 15x(-2)-3x(-2)^2 \\ &= -30-3 \times 4 \\ &= -30-12 \\ &= \underline{\underline{-42}} \end{aligned}$$

$$\begin{aligned} 7. \quad 3\underline{a} - 2\underline{b} \\ &= 3\begin{pmatrix} 2 \\ 4 \\ 5 \end{pmatrix} - 2\begin{pmatrix} -4 \\ 2 \\ 0 \end{pmatrix} \\ &= \begin{pmatrix} 6 \\ 12 \\ 15 \end{pmatrix} - \begin{pmatrix} -8 \\ 4 \\ 0 \end{pmatrix} \\ &= \underline{\underline{\begin{pmatrix} 14 \\ 8 \\ 15 \end{pmatrix}}} \end{aligned}$$

8. $a=3, b=2$

9. (a) $x=0 \Rightarrow y = 4 \times 0^2 + 4 \times 0 - 3$
 $= -3$

$\Rightarrow$ $A(0, -3)$

(b) $y=0 \Rightarrow 4x^2 + 4x - 3 = 0$

$(2x+3)(2x-1) = 0$

$2x+3=0$ or $2x-1=0$

$x = -\frac{3}{2}$ or $x = \frac{1}{2}$

$\Rightarrow$ $B(-\frac{3}{2}, 0)$ $C(\frac{1}{2}, 0)$

(c) at minimum T.P. $x = \frac{-\frac{3}{2} + \frac{1}{2}}{2} = -\frac{1}{2}$

$\Rightarrow y = 4 \times (-\frac{1}{2})^2 + 4 \times (-\frac{1}{2}) - 3$

$= 1 - 2 - 3$

$= -4$

$\Rightarrow$ minimum value $= -4$

10. $\cos a^\circ = \frac{x}{r} = \frac{4}{5}$

11. (a) $3x + 4y = 65$ ①

(b) $5x + 7y = 112$ ②

(c) $5 \times \text{①} : 15x + 20y = 325$ ③

$3 \times \text{②} : 15x + 21y = 336$ ④

④ - ③ : $y = 11$

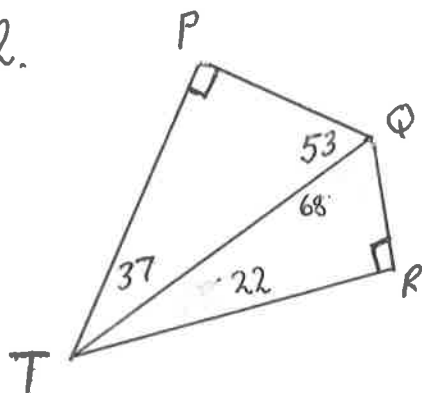
sub. $y = 11$ into ① : $3x + 44 = 65$

$3x = 21$

$x = 7$

1 cm^3 of iron weighs 7 g and 1 cm^3 of lead weighs 11 g

12.



In ΔTPQ , $\angle TPQ = 90^\circ$
 $\angle TQP = 180^\circ - (90^\circ + 37^\circ) = 53^\circ$

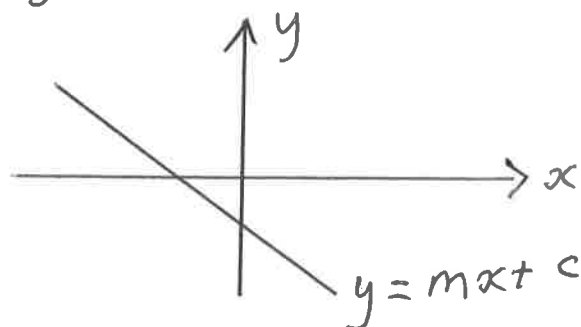
In ΔTQR , $\angle TRQ = 90^\circ$
 $\angle TQR = 180^\circ - (90^\circ + 68^\circ) = 22^\circ$

$\Rightarrow \angle PQR = 53^\circ + 68^\circ = \underline{\underline{121^\circ}}$

13.

$m < 0 \Rightarrow$ negative gradient i.e. slope down from left to right

$c < 0 \Rightarrow$ cuts y -axis below the origin

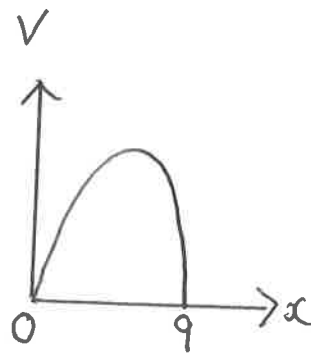


$$\begin{aligned}
 14. \quad \frac{\cos x^\circ \tan x^\circ}{\sin x^\circ} &= \frac{\cos x^\circ \times \frac{\sin x^\circ}{\cos x^\circ}}{\sin x^\circ} \\
 &= \frac{\sin x^\circ}{\sin x^\circ} \\
 &= \underline{\underline{1}}
 \end{aligned}$$

$$15. (a) \text{ width} = \underline{\underline{18 - 2x}}$$

$$\begin{aligned}
 (b) \quad V &= Lbh \\
 &= 100 \times (18 - 2x) \times x \\
 &= 100x(18 - 2x) \\
 &= \underline{\underline{1800x - 200x^2}}
 \end{aligned}$$

$$\begin{aligned}
 (c) \quad V = 0 &\Rightarrow 1800x - 200x^2 = 0 \\
 200x(9 - x) &= 0 \\
 200x = 0 \text{ or } 9 - x &= 0 \\
 x = 0 \text{ or } x &= 9
 \end{aligned}$$



$$\Rightarrow \text{maximum occurs when } x = \frac{9}{2} = 4.5$$

$$\Rightarrow \text{dimensions are } 100 \times (18 - 2 \times 4.5) \times 4.5$$

$$\text{i.e. } \underline{\underline{100\text{cm} \times 9\text{cm} \times 4.5\text{cm}}}$$

N5 Practice Prelim Paper A Calculator

$$\begin{aligned} 1. \quad x^2 - 10x + 18 &= (x-5)^2 - 5^2 + 18 \\ &= (x-5)^2 - 7 \\ \Rightarrow \underline{a=5, b=-7} \end{aligned}$$

$$\begin{aligned} 2. \quad 0.875 \text{ value} &= \text{£}10\,500 \\ \text{value} &= \frac{\text{£}10\,500}{0.875} = \underline{\underline{\text{£}12\,000}} \end{aligned}$$

$$\begin{aligned} 3. \quad \underline{u} + \underline{v} &= \begin{pmatrix} 2 \\ -5 \\ -3 \end{pmatrix} + \begin{pmatrix} 7 \\ 4 \\ -1 \end{pmatrix} = \begin{pmatrix} 9 \\ -1 \\ -4 \end{pmatrix} \\ |\underline{u} + \underline{v}| &= \sqrt{9^2 + (-1)^2 + (-4)^2} = \sqrt{98} \\ &= \sqrt{49} \sqrt{2} \\ &= \underline{\underline{7\sqrt{2}}} \end{aligned}$$

$$4. \quad (a) \text{ mean} = \frac{843.3}{10} = \underline{\underline{84.33 \text{ pence}}}$$

x	x^2
84.2	7089.64
84.2	7089.64
84.4	7123.36
85.6	7327.36
85.1	7242.01
85.2	7259.04
83.9	7039.21
84.9	7208.01
81.0	6561
84.8	7191.04
$\Sigma x = 843.3$	$\Sigma x^2 = 71130.31$

$$\begin{aligned} S &= \sqrt{\frac{71130.31 - \frac{843.3^2}{10}}{9}} \\ &= \sqrt{\frac{14.821}{9}} \\ &= \sqrt{1.6467\ldots} = \underline{\underline{1.28 \text{ pence}}} \end{aligned}$$

4(a) Alternative Method

x	$x - \bar{x}$	$(x - \bar{x})^2$
84.2	-0.13	0.0169
84.2	-0.13	0.0169
84.4	0.07	0.0049
85.6	1.27	1.6129
85.1	0.77	0.5929
85.2	0.87	0.7569
83.9	-0.43	0.1849
84.9	0.57	0.3249
81.0	-3.33	11.0889
84.8	0.47	0.2209
		14.821

$$\begin{aligned}
 S &= \sqrt{\frac{14.821}{9}} \\
 &= \sqrt{1.6467\ldots} \\
 &= \underline{\underline{1.28 \text{ pence}}}
 \end{aligned}$$

(c) The rural prices are higher on average (88.8 pence per litre compared to 84.33 pence per litre in the city) and they are more varied (a standard deviation of 2.4 pence per litre compared to 1.28 pence per litre in the city)

$$5. \quad R^2 t - 3 = M$$

$$R^2 t = M + 3$$

$$R^2 = \frac{M + 3}{t}$$

$$\underline{\underline{R = \sqrt{\frac{M + 3}{t}}}}$$

$$6. \quad 5 \tan x^\circ - 9 = 0$$

$$5 \tan x^\circ = 9$$

$$\tan x^\circ = \frac{9}{5}$$

$$x^\circ = \tan^{-1}\left(\frac{9}{5}\right)$$

$$x^\circ = 60.9^\circ, 180^\circ + 60.9^\circ$$

$$\underline{\underline{x^\circ = 60.9^\circ, 240.9^\circ}}$$

$$\begin{aligned}
 7. \quad & 5000 \times 0.88^3 \\
 & = 3407.36 \\
 & = \underline{\underline{3410 \text{ to nearest } 10}}
 \end{aligned}$$

$$\begin{aligned}
 8(a) \text{ Area of end} &= 5 \times 7 + \frac{1}{2} \times \pi \times 3.5^2 \\
 &= 35 + 19.24 \dots \\
 &= 54.24 \dots \text{m}^2
 \end{aligned}$$

$$\begin{aligned}
 V &= 54.24 \dots \times 12 \\
 &= 650.90 \dots \\
 &= \underline{\underline{650 \text{ m}^3 (2sf)}}
 \end{aligned}$$

$$\begin{aligned}
 (b) \text{ Area of end} &= 3w + \frac{1}{2} \times w \times 2 \\
 &= 4w
 \end{aligned}$$

$$\begin{aligned}
 V &= 4w \times 12 \\
 &= 48w
 \end{aligned}$$

$$\Rightarrow 48w = 200$$

$$\underline{\underline{w = 4.16 \dots \text{m}}}$$

$$9. (a) \vec{AB} = \vec{AO} + \vec{OB} = -\underline{a} + \underline{b} = \underline{\underline{b - a}}$$

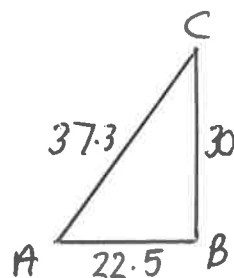
$$(b) \vec{OC} = 2\vec{AB} = \underline{\underline{2(b - a)}}$$

$$10. \quad 37.3^2 = 1391.29 ; \quad 22.5^2 + 30^2 = 1406.25$$

$$37.3^2 \neq 22.5^2 + 30^2$$

$$\Rightarrow \angle ABC \neq 90^\circ$$

$$\underline{\underline{\Rightarrow \text{Frame is not rectangular}}}$$



$$\begin{aligned}
 11. \quad V &= \pi r^2 h + \frac{4}{3} \pi r^3 \\
 &= \pi \times 4^2 \times 15 + \frac{4}{3} \times \pi \times 4^3 \\
 &= 753.98 \dots + 268.08 \dots \\
 &= \underline{\underline{1022.06 \dots \text{ mm}^3}}
 \end{aligned}$$

$$\begin{aligned}
 12. \quad \frac{m}{3} &= \frac{1-m}{5} \\
 5m &= 3(1-m) \\
 5m &= 3 - 3m \\
 8m &= 3 \\
 m &= \frac{3}{8}
 \end{aligned}$$

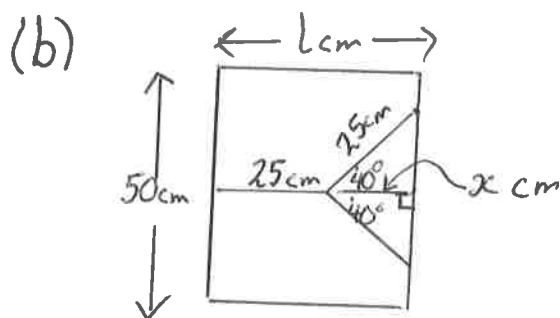
$$13. \quad \frac{x}{360} = \frac{\text{length of arc}}{\text{circumference}}$$

$$\frac{x}{360} = \frac{7}{\pi \times 12}$$

$$x = 360 \times \frac{7}{12\pi}$$

$$\underline{\underline{x = 66.8 \dots^\circ}}$$

$$\begin{aligned}
 14(a) \quad A &= \frac{280}{360} \times \pi r^2 \\
 &= \frac{280}{360} \times \pi \times 25^2 \\
 &= \underline{\underline{1527.16 \dots \text{ cm}^2}}
 \end{aligned}$$



$$\cos 40^\circ = \frac{x}{25}$$

$$x = 25 \cos 40^\circ$$

$$x = 19.15 \dots$$

$$\begin{aligned}
 l &= 25 + 19.15 \dots \\
 &= \underline{\underline{44.15 \dots \text{ cm}}}
 \end{aligned}$$