

$$1) \quad 1 \frac{3}{5} + 2 \frac{4}{7}$$

$$= \frac{8}{5} + \frac{18}{7}$$

$$= \frac{8 \times 7}{5 \times 7} + \frac{18 \times 5}{7 \times 5}$$

$$= \frac{56}{35} + \frac{90}{35}$$

$$= \boxed{\frac{146}{35}}$$

$$2) \quad (a) \quad 4x^2 - y^2 = \boxed{(2x+y)(2x-y)}$$

$$(b) \quad \frac{4x^2 - y^2}{6x + 3y}$$

$$= \frac{(2x+y)(2x-y)}{3(2x+y)}$$

$$= \boxed{\frac{2x-y}{3}}$$

3) On average, the number of cigarettes smoked per person went down after the course, as $9.6 < 20.8$.

The number of cigarettes smoked per person was more consistent before the course, as $8.5 < 12.0$.

$$4) \quad (a) \quad m = \frac{33-21}{15-9}$$

$$(15, 33)$$

$$m = \frac{12}{6}$$

$$(9, 21)$$

$$\underline{m = 2}$$

$$y = 2x + c$$

$$21 = 2(9) + c$$

$$21 = 18 + c$$

$$\underline{c = 3}$$

$$\therefore \boxed{y = 2x + 3}$$

$$(b) \quad x = 20$$

$$y = 2(20) + 3$$

$$\underline{y = 43}$$

$$\boxed{\text{Sport score} = 43}$$

$$5) \quad \vec{AB} = \begin{pmatrix} 3 \\ 0 \\ -3 \end{pmatrix}$$

$$|\vec{AB}| = \sqrt{9+0+9}$$

$$|\vec{AB}| = \sqrt{18}$$

$$|\vec{AB}| = \sqrt{9} \sqrt{2} \Rightarrow \boxed{|\vec{AB}| = 3\sqrt{2}}$$

6)

$$13 + 4x < 18 - 7(2 - x)$$

$$13 + 4x < 18 - 14 + 7x$$

$$13 + 4x < 4 + 7x$$

$$13 < 4 + 3x$$

$$9 < 3x$$

$$3 < x$$

$$x > 3$$

7)

$$y = (x - 1)^2 - 4$$

8)

$$(a) \quad 2y + x = 6$$

$$2y = -x + 6$$

$$y = -\frac{1}{2}x + 3$$

$$m = -\frac{1}{2}$$

$$(b) \quad y\text{-intercept} = c = 3$$

$$9) \quad P\hat{Q}T = 180^\circ - 90^\circ - 37^\circ$$

$$\Rightarrow \underline{P\hat{Q}T = 53^\circ}$$

$$Q\hat{T}V = 90^\circ - 68^\circ \Rightarrow \underline{Q\hat{T}V = 22^\circ}$$

$$T\hat{Q}R = 180^\circ - 90^\circ - 22^\circ$$

$$\Rightarrow \underline{T\hat{Q}R = 68^\circ}$$

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

$$P\hat{Q}R = 53^\circ + 68^\circ$$

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

$$10) \quad y = \cos(x - a)$$

$$\boxed{a = 30}$$

$$11) \quad 120\% \text{ of } x = 900g$$

$$1.2x = 900g$$

$$x = \frac{900}{1.2}g$$

$$x = 900 \div \frac{6}{5}$$

$$x = \frac{900}{1} \times \frac{5}{6}$$

$$x = \left(\frac{150}{1} \times \frac{5}{1} \right) / 9$$

$$x = 750g$$

12) $y = x^2 - 3x + 5$

(a) For roots, $y = 0$:

$$x^2 - 3x + 5 = 0$$

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

$$\begin{pmatrix} a = 1 \\ b = -3 \\ c = 5 \end{pmatrix}$$

$$D = (-3)^2 - 4(1)(5)$$

$$D = 9 - 20$$

$$D = -11$$

As $D < 0$, no real roots

(b) $y = x^2 - 3x + 5$

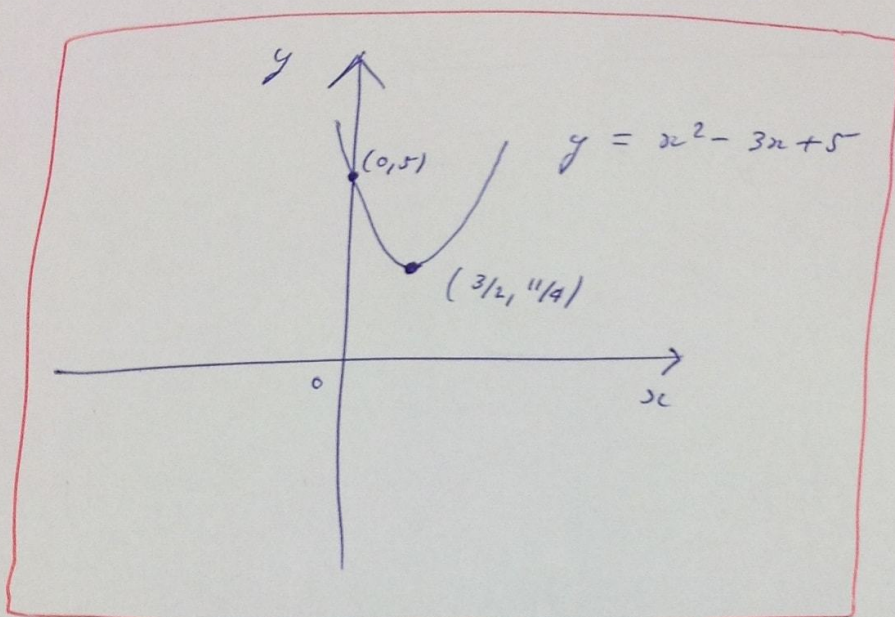
$$y = \left(x - \frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)^2 + 5$$

$$y = \left(x - \frac{3}{2}\right)^2 - \frac{9}{4} + \frac{20}{4}$$

$$y = \left(x - \frac{3}{2}\right)^2 + \frac{11}{4}$$

$$c) \quad y = x^2 - 3x + 5$$

$$x = 0 \Rightarrow y = 0 - 0 + 5 \Rightarrow \underline{y = 5}$$



$$13) \quad (a) \quad \text{Area} = \frac{1}{2} \times 20 \times 15$$

$$\text{Area} = 10 \times 15$$

$$\text{Area} = 150 \text{ m}^2$$

$$(b) \quad \text{Area} = 150 = \frac{1}{2} \times 25 \times BD$$

$$\therefore \frac{1}{2} BD = \frac{150}{25}$$

$$\Rightarrow \frac{1}{2} BD = 6$$

$$\Rightarrow BD = 12 \text{ m}$$

NS Practice Paper F - Solutions

(P2)

$$1) \quad C = 2\pi r$$

$$C = 2\pi \times 4.96 \times 10^7$$

$$C = 311\,645\,991.2\dots$$

$$C = 3.116 \times 10^8 \text{ km}$$

$$2) \quad 35\,000 \times (0.92)^4 = 25\,073.7536$$

$$\therefore \approx 25\,073.75$$

3)

$$\frac{x}{c} + a = b$$

$$x + ac = bc$$

$$x = bc - ac$$

4)

$$4x + 2y = 13 \quad \textcircled{1} \quad \times 3$$

$$5x + 3y = 17 \quad \textcircled{2} \quad \times 2$$

$$12x + 6y = 39 \quad \textcircled{3}$$

$$10x + 6y = 34 \quad \textcircled{4}$$

③ - ④:

$$2x = 5$$

$$x = \frac{5}{2}$$

Substitute $x = \frac{5}{2}$ into ①:

$$4\left(\frac{5}{2}\right) + 2y = 13$$

$$10 + 2y = 13$$

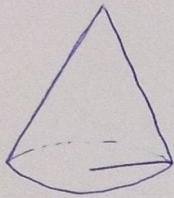
$$2y = 3$$

$$y = \frac{3}{2}$$

\therefore

$$x = \frac{5}{2}, y = \frac{3}{2}$$

5)

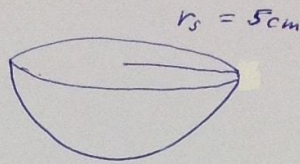


$$r_c = 5 \text{ cm}$$
$$h_c = 16 - 5$$
$$h_c = 11 \text{ cm}$$

$$V_c = \frac{1}{3} \pi r_c^2 h_c$$

$$V_c = \frac{1}{3} \times \pi \times 25 \times 11$$

$$V_c = 287.97\dots$$



$$V_s = \frac{4}{3} \pi r_s^3$$

$$V_s = \frac{4}{3} \times \pi \times 5^3$$

$$V_s = 523.59\dots$$

$$\therefore \frac{1}{2} V_s = 261.79\dots$$

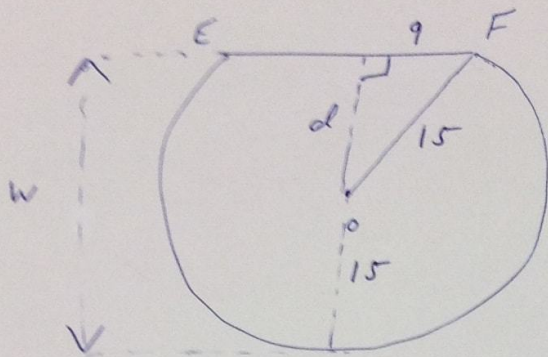
$$V_T = V_c + V_s$$

$$V_T = 287.97\dots + 261.79\dots$$

$$V_T = 549.77\dots$$

$$V_T = 550 \text{ cm}^3 \text{ (2 s.f.)}$$

6)



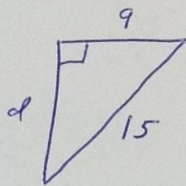
$$(w = d + 15)$$

$$d^2 = 15^2 - 9^2$$

$$d^2 = 225 - 81$$

$$d^2 = 144$$

$$\underline{d = 12}$$

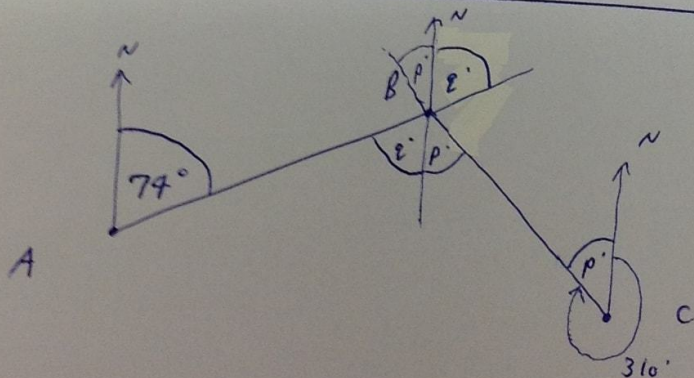


$$w = d + 15$$

$$w = 12 + 15$$

$$\boxed{w = 27 \text{ cm}}$$

7) (a)



$$p' = 360^\circ - 310^\circ$$

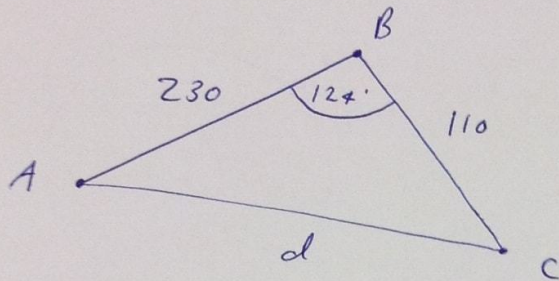
$$p' = 50^\circ$$

$$\underline{e' = 74^\circ}$$

$$\widehat{ABC} = p' + e'$$

$$\widehat{ABC} = 50^\circ + 74^\circ \Rightarrow \boxed{\widehat{ABC} = 124^\circ}$$

(b)



$$d^2 = 230^2 + 110^2 - (2 \times 230 \times 110 \times \cos 124^\circ)$$

$$d^2 = 52\,900 + 12\,100 - (-28\,295.16\dots)$$

$$d^2 = 93\,295.16\dots$$

$$d = 305.44\dots$$

$$d = 305 \text{ m (3 s.f.)}$$

8)

$$\frac{3}{x+1} - \frac{1}{x-2}$$
$$= \frac{3(x-2)}{(x+1)(x-2)} - \frac{1(x+1)}{(x+1)(x-2)}$$

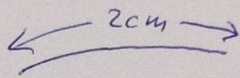
$$= \frac{3(x-2) - (x+1)}{(x+1)(x-2)}$$

$$= \frac{3x - 6 - x - 1}{(x+1)(x-2)} = \frac{2x - 7}{(x+1)(x-2)}$$

$$9) L = \frac{\theta}{360} \times 2\pi r$$

$$L = \frac{284}{360} \times 2 \times \pi \times 9$$

$$L = 44.610\dots$$



$$\frac{L}{2} = \frac{44.610\dots}{2}$$

$$\frac{L}{2} = 22.3053\dots$$

$$22.3053\dots \times 100 = 2230.53\dots$$

$$\therefore 2230.5 \text{ g (1 d.p.)}$$

$$10) d = \frac{1}{2} n(n-3)$$

$$(a) d = \frac{1}{2} (7)(7-3)$$

$$d = \frac{1}{2} (7)(4)$$

$$d = 14$$

$$(b) \quad d = 65$$

$$65 = \frac{1}{2} n(n-3)$$

$$n(n-3) = 130$$

$$n^2 - 3n = 130$$

$$\boxed{n^2 - 3n - 130 = 0}$$

$$(c) \quad n^2 - 3n - 130 = 0$$

$$(n-13)(n+10) = 0$$

$$\underline{n = -10, 13}$$

As $n > 0$, $\boxed{n = 13}$

$$11) \quad h(t) = -31 \cos t + 33$$

$$(a) \quad h(20) = -31 \cos 20^\circ + 33$$

$$h(20) = 3.869\dots$$

$$\boxed{h(20) = 3.87 \text{ m (2 d.p.)}}$$

$$(b) \quad h(t) = 60$$

$$60 = -31 \cos t + 33$$

$$31 \cos t = 33 - 60$$

$$31 \cos t' = -27$$

$$\cos t' = -0.8709\dots$$

$$RA = \cos^{-1}(0.8709\dots)$$

$$RA = 29.428\dots$$

$$t' = 180^\circ - 29.428\dots,$$

$$t' = 180^\circ + 29.428\dots$$

$$\therefore \underline{t' = 150.57\dots}$$

$$\therefore \boxed{t = 150.6 \text{ s}}$$

$$(c) \quad t' = 180^\circ + 29.428\dots$$

$$t' = 209.42\dots$$

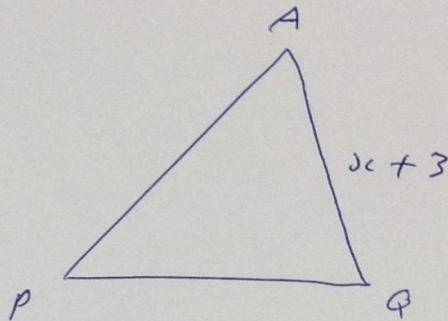
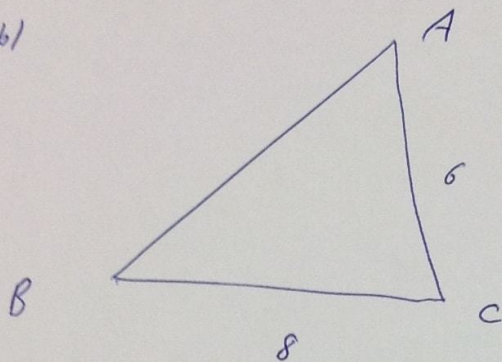
$$\therefore \boxed{t = 209.4 \text{ s}}$$

S	A
✓	
$180^\circ - RA$	RA
$180^\circ + RA$	$360^\circ - RA$
✓	
T	C

$$12) (a) AQ = AM + MQ$$

$$AQ = 3 + x$$

(b)



$$\frac{PQ}{8} = \frac{x+3}{6}$$

$$PQ = \frac{8}{6}(x+3)$$

$$PQ = \frac{4}{3}(x+3)$$

$$PQ = \frac{4}{3}x + 4$$

$$PQ = \left(4 + \frac{4}{3}x\right) \text{ cm}$$