2014 National 5 Paper 1

1. $\frac{5}{12} \times 2\frac{2}{9}$

$= \frac{5}{\cancel{12}_{3}} \times \frac{\cancel{20}^{5}}{9}$

$= \frac{25}{27}$

2. $(2x-5)(3x+1)$

$= 6x^2 + 2x - 15x - 5$

$= 6x^2 - 13x - 5$

3. $x^2 - 14x + 44$

$= (x-7)^2 - 5$

$(x-7)^2$

$= x^2 - 14x + 49$

4. $2\underline{u} = \begin{pmatrix} -4 \\ 6 \\ 10 \end{pmatrix}$ $\underline{v} = \begin{pmatrix} 0 \\ -4 \\ 7 \end{pmatrix}$

$2\underline{u} - \underline{v} = \begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$

5. $\frac{L}{\sin L} = \frac{m}{\sin M} = \frac{k}{\sin k}$

$\frac{18}{0.9} = \frac{LM}{0.4}$

$0.9LM = 0.4 \times 18$

$LM = \frac{0.4 \times 18}{0.9}$

$= \frac{7.2}{0.9} = 8\text{cm}$

6a) A(5, 200) B(25, 500)

$m_{AB} = \frac{y_A - y_B}{x_A - x_B}$

$= \frac{200-500}{5-25} = \frac{-300}{-20} = 15$

$y = 15x + C$

When $x = 5$, $y = 200$

$200 = 15(5) + C$

$200 = 75 + C$

$C = 125$

$y = 15x + 125$

$C = 15F + 125$.

b) $C = 15 \times 40 + 125$

$= 600 + 125$

$= 725$ calories

7. $y = ax^2$

at $(-3, 45)$

$45 = a(-3)^2$

$45 = a \times 9$

$a = \frac{45}{9}$

$a = 5$ $y = 5x^2$

8. $\sqrt{40} + 4\sqrt{10} + \sqrt{90}$

$= \sqrt{4}\sqrt{10} + 4\sqrt{10} + \sqrt{9}\sqrt{10}$

$= 2\sqrt{10} + 4\sqrt{10} + 3\sqrt{10}$

$= 9\sqrt{10}$

9. $80\% = 480000$

$10\% = 480000 \div 8$

$= 60000$

$100\% = 600000$

10. $a = 3$, $b = 40$

$y = 3\sin(x+40)^\circ$

2014 National 5 Paper 2

11a) $4x + 3y = 12$

$3y = -4x + 12$

$y = -\frac{4}{3}x + 4$

gradient = $-\frac{4}{3}$

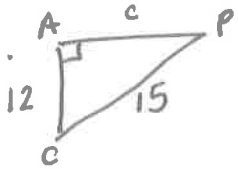
b) $4x + 3y = 12$

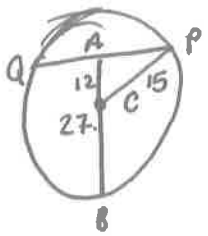
on x axis, $y = 0$

$4x + 0 = 12$

$x = 3$ $\quad (3, 0)$

12.





$AP^2 = 15^2 - 12^2$

$= 225 - 144$

$= 81$

$AP = \sqrt{81}$

$= 9$ cm

$PQ = 9 \times 2 = 18$cm

13a) $16t - t^2 = 60$

$0 = t^2 - 16t + 60$

$0 = (t - 10)(t - 6)$

$t = 10$ or $t = 6$

First: after 6 seconds.

$t^2 - 16t + 70$

b) $a = 1$, $b = -16$, $c = 70$

$b^2 - 4ac$

$= 256 - 4(1)(70)$

$= -24$

$b^2 - 4ac < 0$ ∴ no real roots => will not reach 70m.

16
36
96
+160
256

2014 National 5 Paper 2

1. $964 \times 0.85^3 = 590.02$

= 590 to nearest 10.

2. B (8.4, 10) C (4, 0, 10)

3a. $05a + 3c = 158.25$ (x2)

b. $3a + 2c = 98.00$ (x3)

c. $10a + 6c = 316.50$

$-\ 9a + 6c = 294.00$ −

$a = 22.50$

Sub $a = 22.50$ into ①

$5(22.50) + 3c = 158.25$

$3c = 158.25 - 112.50$

$3c = 45.75$

$c = 15.25$

Adult = £22.50, Child = £15.25.

4 a i) $\bar{x} = \frac{53+57+58+60+55+56}{6}$

$= 56.5$

ii)

x	$x - \bar{x}$	$(x-\bar{x})^2$
53	−3.5	12.25
55	−1.5	2.25
56	−0.5	0.25
57	0.5	0.25
58	1.5	2.25
60	3.5	+12.25
		29.50

$s = \sqrt{\frac{\Sigma (x-\bar{x})^2}{n-1}}$

$= \sqrt{\frac{29.50}{5}}$

$= 2.43.$

b) No because the standard dev is higher.

5. Scale factor $= \left(\frac{8}{5}\right)^3$

Volume $= \left(\frac{8}{5}\right)^3 \times 750$

$= 3072\ cm^3$

6. If north, Midtown is 090°.

$85^2 + 75^2$ $\qquad 110^2 = 12100$

$= 7225 + 5625$

$= 12850$

$85^2 + 75^2 \neq 110^2$

Since $a^2 \neq b^2 + c^2$ ∴ not right angled ∴ not directly north.

7. $V_{cone} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \pi \times 4^2 \times 15$

$= 251.32 cm^3$

$V_{hemi} = \frac{1}{2}\left(\frac{4}{3}\pi r^3\right)$

$= \frac{4}{6} \pi \times 3.7^3$

$= 106.08\ cm^3$

$V_{glass} = 251.32 - 106.08$

$= 145.24$

$= 150$ to 2 sig figs.

8. $\frac{n^5 \times n^7}{2n^2}$

$= \frac{10n^6}{2n^2}$

$= 5n^4$

2014 National 5 paper 2.

9. $\frac{7}{x+5} - \frac{3}{x}$

$= \frac{7x}{x(x+5)} - \frac{3(x+5)}{x(x+5)}$

$= \frac{7x - 3x - 15}{x(x+5)}$

$= \frac{4x - 15}{x(x+5)}$

10a) $\cos B = \frac{8^2 + 11^2 - 13^2}{2 \times 8 \times 11}$

$B = \cos^{-1}(0.09)$

$B = 84.8^\circ$

11. $S = ut + \frac{1}{2}at^2$

$S - ut = \frac{1}{2}at^2$

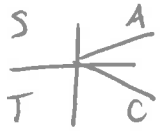
$2(S - ut) = at^2$

$a = \frac{2(s - ut)}{t2}$

12. $11\cos x - 2 = 3$

$11\cos x = 5$

$\cos x = \frac{5}{11}$



$x = \cos^{-1}(5 \div 11)$

$x = 62.964\ldots$

$x^\circ = 63.0^\circ, 360 - 63$

$x^\circ = 63^\circ, 297^\circ$

13. Area Sector $= \frac{310}{360} \times \pi \times 7^2$

$= 132.557\ldots$

$= 132.6 m^2$

Area of triangle $= \frac{1}{2}ab\sin C$

$= \frac{1}{2}(7)(7)\sin 50^\circ$

$= 18.788\ldots$

$= 18.8 m^2$

Total area $= 132.6 + 18.8$

$= 151.4 m^2$.