Third Form Promotion Exam 2012 (Solutions)

1 $I = \frac{PRT}{100}$

$90 = \frac{500 \times 6 \times T}{100}$

$90 = 30T$

$3 = T$ D

2 $P(\text{yellow}) = \frac{14-(5+3)}{14} = \frac{6}{14}$

$= \frac{3}{7}$ B

3 35, 36, 37, 38, 39, 40, 41

36: lower quartile; 38: median; 40: upper quartile

Interquartile Range $= 40 - 36$

$= 4$ C

4 $2x + 3 \geq 12$ A

5 $y \propto x^2$

$y = kx^2$

$2 = k(3)^2$

$2 = 9k$

$\frac{2}{9} = k$

$y = \frac{2}{9}x^2$

$= \frac{2}{9} \times 9^2$

$= 18$ C

(2)

6 $S \propto \frac{1}{T^3}$

$S = \frac{k}{T^3}$

$56 = \frac{k}{\left(\frac{1}{2}\right)^3}$

$56 = \frac{k}{\frac{1}{8}}$

$56 \times \frac{1}{8} = k$

$7 = k$

$S = \frac{7}{T^3}$

$= \frac{7}{\left(\frac{1}{3}\right)^3}$

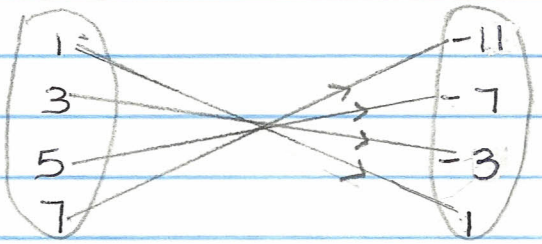
$= \frac{7}{\frac{1}{27}}$

$= 7 \div \frac{1}{27}$

$= 7 \times \frac{27}{1}$

$= 189$

7 $x \longrightarrow 3 - 2x$



8 $12x^2yz^2 \times \frac{1}{4}xz^2$

$= (12 \times \frac{1}{4}) \times (x^2 \times x) \times y \times (z^2 \times z^2)$

$= 3x^{2+1}yz^{2+2}$

$= 3x^3yz^4$

9 $P = \frac{RT^2}{V}$

$PV = RT^2$

$\frac{PV}{R} = T^2$

$\sqrt{\frac{PV}{R}} = T$

10 $4x - 6y = -5$ ①

$7x - 5y = -6$ ②

$7 \times$ ① $28x - 42y = -35$ ③

$4 \times$ ② $28x - 20y = -24$ ④

③ − ④ $-22y = -11$

$y = \frac{1}{2}$

Sub. $y = \frac{1}{2}$ into eq ①

$4x - 6(\frac{1}{2}) = -5$

$4x - 3 = -5$

$4x = -2$

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

11a) $m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-5 - (-1)}{-2 - 4}$

$= \frac{-4}{-6}$

$= \frac{2}{3}$

(4)

ii) $y = mx + c$

$-1 = \frac{2}{3}(4) + c$

$-1 = \frac{8}{3} + c$

$-1 - \frac{8}{3} = c$

$-\frac{11}{3} = c$

$y = \frac{2}{3}x - \frac{11}{3}$

$3y = 2x - 11$

iii) $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$= \left(\frac{4 + (-2)}{2}, \frac{-1 + (-5)}{2}\right)$

$= \left(\frac{2}{2}, -\frac{6}{2}\right)$

$= (1, -3)$

b gradient of perpendicular bisector $= -\frac{3}{2}$

$y = mx + c$

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

$-3 = -\frac{3}{2} + c$

$-3 + \frac{3}{2} = c$

$\frac{-6+3}{2} = c$

$-\frac{3}{2} = c$

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

$2y = -3x - 3$

12(i) Allowances $= \$2000 + \$500 + \$300 + \$350$

$= \$3150$

(ii) Taxable Income $= \$15000 - \$3150 = \$11850$

(iii) Tax $= \frac{30}{100} \times 11850$

$= \$3555$

13 i) Volume of cylinder $= \pi r^2 h$

$= \frac{22}{7} \times (\frac{35}{2})^2 \times 25$

$= 24062.5 \text{ m}^3$

ii) Volume of cone $= 31170.5 - 24062.5$

$= 7108 \text{ m}^3$

iii) $h^2 + r^2 = 28^2$

$h^2 + (\frac{35}{2})^2 = 28^2$

$h^2 = 28^2 - (\frac{35}{2})^2$

$= 477.75$

$h = \sqrt{477.75}$

$= 22 \text{ m}$

iv Total surface area $= \pi r^2 + 2\pi rh + \pi rl$

$= [\frac{22}{7} \times (\frac{35}{2})^2] + [2 \times \frac{22}{7} \times \frac{35}{2} \times 25] + [\frac{22}{7} \times \frac{35}{2} \times 28]$

$= 962.5 + 2750 + 1540$

$= 5252.5 \text{ m}^2$

14a) CAN \$500 $= 500 \times 2.10 =$ BDS \$1050

b) Amount remaining $=$ \$1050 $-$ \$400 $=$ BDS \$650

BDS \$650 $= 650 \times 1.35 =$ EC \$877.50

(6)

c Amount remaining = 877·50 − 200 = EC$677·50

$$EC\$677\cdot50 = \frac{677\cdot50}{2\cdot80} = CAN\$313\cdot39$$

15(i) No. of students = 5 + 10 + 12 + 3 = 30

(ii) Modal class = 33 − 37

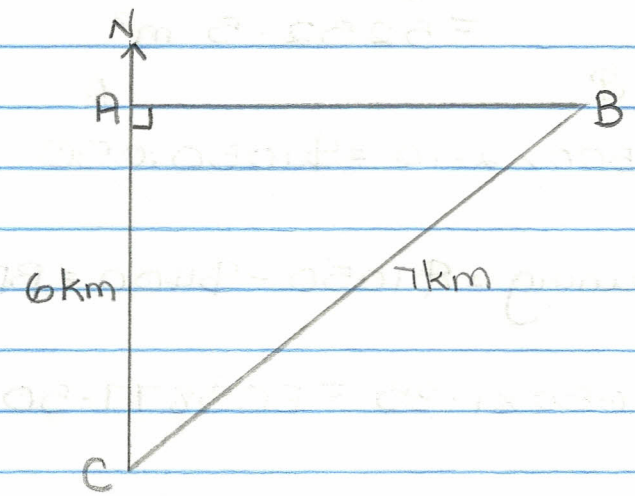
(iii)

Weight (kg)	Frequency, f	Midpoint, x	fx
23 − 27	5	25	125
28 − 32	10	30	300
33 − 37	12	35	420
38 − 42	3	40	120
	30		965

$$\text{Mean} = \frac{965}{30} = 32\cdot2$$

(iv) P

16(i)



(ii)a) $AB^2 + 6^2 = 7^2$

$AB^2 = 7^2 - 6^2$

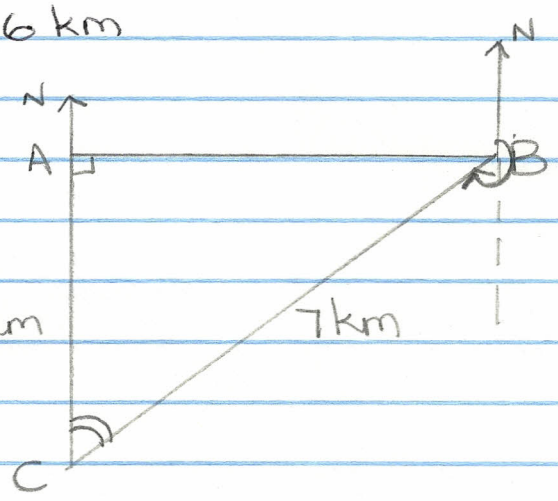
$= 49 - 36$

$= 13$

$AB = \sqrt{13}$

$= 3.6$ km

b)



$\cos A\hat{C}B = \frac{6}{7}$

$A\hat{C}B = \cos^{-1}\left(\frac{6}{7}\right)$

$= 31.0^\circ$

Bearing of C from B $= 31.0^\circ + 180^\circ$

$= 211.0^\circ$