2013 General Maths Half Yearly HSC Exam Multiple Choice Q1-24

(1.) $8a-(a-5b) = 8a-a+5b$
$= 7a+5b$ ∴A

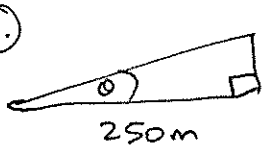
(2.) $\frac{a}{b^2}-c \Rightarrow \frac{24}{2^2}-(-10) = 6+10=16$
∴D

(3.) $\frac{15a^3b^8}{25a^6b^2} = \frac{3b^6}{5a^3}$ ∴A

(4.) $s = ut+\frac{at^2}{2}$
$s-ut = \frac{at^2}{2}$ (−ut)
$2(s-ut) = at^2$ (×2)
$\frac{2(s-ut)}{t^2} = a$ (÷t²)
∴B

(5.) AREA $= \frac{1}{2}\times 16\times 9\times \sin 30°$
$= 36\,cm^2$ ∴B

(6.) $\cos B = \frac{40^2+80^2-60^2}{2\times 40\times 80} = \frac{11}{16}$
$\therefore B = \cos^{-1}(\frac{11}{16}) \doteq 47°$ ∴B

(7.)


$\theta = \tan^{-1}(\frac{20}{250})$
$\doteq 5°$ ∴B

(8.) $\tan 32° = \frac{d}{60}$
$\therefore d = 60\times\tan 32° = 37.5m$
∴height $= 20m+37.5m$
$= 57.5m$ ∴D

(9.) B : G
3 : 4 ∴green $= \frac{4}{7}$ ∴C

(10.) $100\% - 25\% - 15\% = 60\%$
(rect) (tri) ∴A

(11.) $P(3) = \frac{2}{12} = \frac{1}{6}$ ∴C

(12.) 6 white, 6 dark, 12 milk } 24. ⇒ 6 white, 4 dark, 12 milk } 22
$\therefore P(dark) = \frac{4}{22} = \frac{2}{11}$
∴D

(13.) $0.2\times 0.2 = 0.04$ ∴A

(14.) $6\times5\times4\times3\times2\times1 = 720$ ∴C

(15.) $\frac{5\times4\times3}{3\times2\times1} = \frac{60}{6} = 10$ ways ∴A

(16.) $\frac{163}{200}\times\frac{100}{1} = 81.5\%$ ∴A.

(17.) $32°+40° = 72°$ ∴C

(18.) 2 hours = 120 min
120 min ÷ 4 min = 30°
(1° = 4 min)
~~∴248°W + 30° = 278~~
from 45°W, go East 30°.
∴15°W.
Coordinates = 15°W, 10°N ∴A

(19.) $1250M\times 1.852 = 2315km$
∴D

(20.) $l = \frac{22°}{360°}\times 2\pi\times 6400\,km$
$= 2457\,km$ ∴C.

(21.) $y = \frac{240}{40} = 6$ ∴A

(22.) D → fixed cost that can't change.

(23.) $y = 2-x^2$
$= -x^2+2$
Cie. upside down parabola moved 2 units up).
∴D

(24.) $10\,000\times 0.95^n$ ← implies an index
∴exponential.
∴D

2013 General Maths HY exam.

Q25 ALGEBRA

a) $\sqrt{\frac{5ab}{3}} = \sqrt{\frac{5\times30\times18}{3}} = 30$ ✓ ✓ 2mks

b) $y = mx + b$

$18 = 3m - 9$ ✓

$3m = 27$

$\therefore m = 9$ ✓ 2mks

c) i) $10x - y + 3x + 5y - x$

$= 12x + 4y$

(ii) $\frac{a^2}{4} \times \frac{22}{ab^2} = \frac{22a^2}{4ab^2} = \frac{11a}{2b^2}$

(iii) $\frac{20m(m-2)}{2n(n-2)} = \frac{10m}{n}$

d) i) $5x - 3 = 17$

$5x = 20$

$\therefore x = 4$

(ii) $\frac{2x-1}{3} + \frac{7-x}{2} = 4$

$(\times 6)\ \frac{6(2x-1)}{3} + \frac{6(7-x)}{2} = 24$

$2(2x-1) + 3(7-x) = 24$

$4x - 2 + 21 - 3x = 24$

$x + 19 = 24$

$\therefore x = 5$ 3mks

e) $a = \frac{2Rn}{n+1}$

$a(n+1) = 2Rn$

$\therefore R = \frac{a(n+1)}{2n}$ 2mks

Q26 TRIGONOMETRY

a) Bearing $= 90° + 56° = 146°$

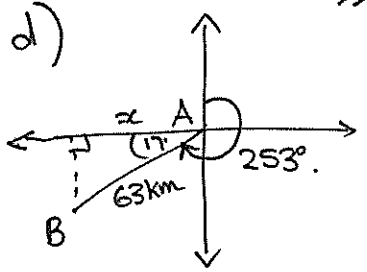
b) $\frac{5\sin 32°}{\sin 60°} = 3.1$ (1 dp) ½ off rounding

c) $\cos\theta = 0.232$

$\theta = \cos^{-1}(0.232)$

$\therefore \theta = 77°$ (nearest deg)

d)

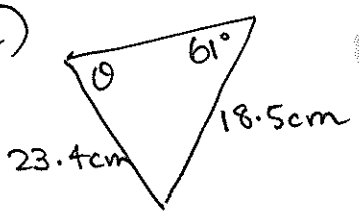


$\cos 17° = \frac{x}{63}$ ✓

$x = 63 \times \cos 17°$

$\doteq 60$ km ✓ 2mk

e)



$\frac{\sin\theta}{18.5} = \frac{\sin 61°}{23.4}$ ✓

$\sin\theta = \frac{\sin 61°}{23.4} \times 18.5$

$\sin\theta = 0.69$

$\theta = \sin^{-1}(0.69)$

$\theta = 43°45'$ ✓

f) i) Bearing $= 360° - 33°$

$= 327°$ 2mk ½ off rounding

(ii) Using the Cosine Rule,

$c^2 = a^2 + b^2 - 2ab\cos C°$ ✓

$XW^2 = 61^2 + 53^2 - 2\times61\times53\times\cos 72°$

$XW^2 = 4531.896$ ✓

$\therefore XW = 67$ m ✓ (nearest metre) 3mks

(iii) Using Sine Area Rule

$A = \frac{1}{2}ab\sin C°$

$= \frac{1}{2}\times61\times53\times\sin 72°$ ✓

$\doteq 1537$ m² ✓ 2mks

13 mks.

Q27. Multi Stage Events

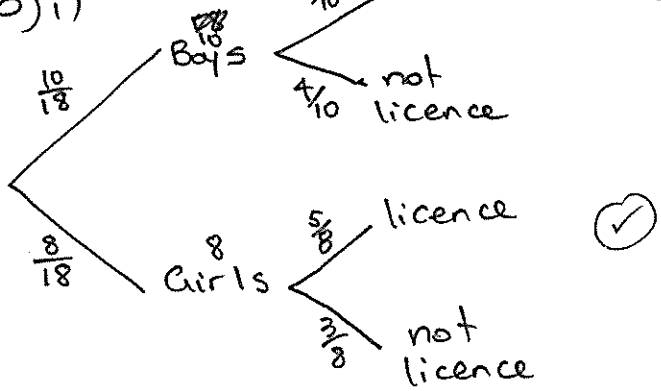
(a) i) A B C ✓
A C B ✓
B A C ×
B C A ×
C A B ✓
C B A ×
} 6 ways.

✓✓ 2mks

(ii) $\frac{3}{6}$ or $\frac{1}{2}$ (or 50%)

Allow $\frac{2}{2} = \frac{1}{8}$

(b) i)



(ii) P(girl) = $\frac{8}{18}$ or $\frac{4}{9}$

(iii) P(license) = $\frac{11}{18}$ ✓✓ 2mks

(iv) P(girl + licence) = $\frac{8}{18} \times \frac{5}{8} = \frac{5}{18}$

(v) P(boy without licence) = $\frac{4}{18}$ ✓✓ 2mks

(c) i) $5 \times 4 = 20$

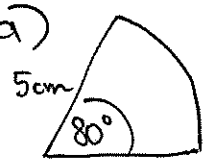
(ii) $5 \times 4 \times 3 \times 2 = 120$

(d) $\frac{10 \times 9 \times 8 \times 7 \times 6}{5 \times 4 \times 3 \times 2 \times 1}$

$= 252$

Q28. Spherical Geometry

(a)



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

$= \frac{80}{360} \times 2\pi \times 5$

$\doteq 6.98$ cm

(b) 40° EAST of (15°N, 165°E)

= (15°N, 155°W)

(c) 2400 km $\div 1.852 = 1295.9$ M ✓

$\therefore S = \frac{D}{T} = \frac{1295.9}{4} = 324$ kn ✓

(d) i) 40° ✓ 2mks

(ii) $100^\circ \times 60M = 6000$ M ✓✓ 2mks

(iii) $T = \frac{D}{S} = \frac{6000\text{ M}}{60\text{ knots}} = 100$ hrs.

(iv) 100 hours = 4 days, 4 hours.

MONDAY AUG 1, 6am + 4 days, 4 hrs

= AUG 5, 10 am (X local time)

Time diff from X to Y = $100^\circ \times 4$ min

= 400 min

= 6h 40 min. ✓

$\therefore$ AUG 5, 10am + 6h 40 min

= AUG 5, 4:40 pm ✓✓ 3mks

(e) Perth 5pm + 4hrs = 9pm (Perth time)

9pm + 2hrs = 11 pm (Sydney time)

✓✓ 2mks

Q29. Applications of Probability

(a) $0.8 \times 80 = 64$

(b)(i) F.E. $= \frac{1}{2} \times \$6 + \frac{1}{2} \times -\$7$

$= -\$0.50$

(ii) $100 \times -\$0.50 = -\$50$ ✓✓ 2mks

(c) F.E. $= 0.4 \times 12 + 0.6 \times x = 0$ ✓

$4.8 + 0.6x = 0$

$0.6x = -4.8$

$x = -\$8$ ✓✓ 3mks

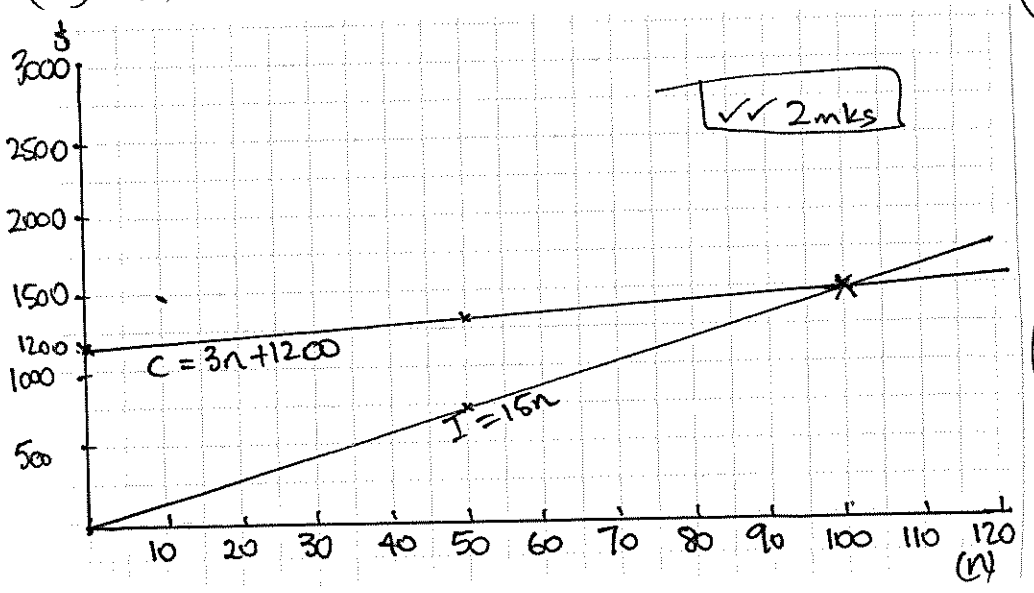
(d) i) $A = 96$

ii) $\frac{75}{89}$ or 84%

iii) $14 + 15 = 29$ ✓✓ 2mks

Q30. Modelling – Linear + Non Lin.

(a) i)



✓✓ 2mks

(ii) Break even point (100, 1500)

(iii) If $n = 50$, $C = 3 \times 50 + 1200 = 1350$

$I = 15 \times 50 = 750$

∴ loss $= \$600$

Q30(b)(i) $S \propto R^2$

$S = kR^2$

When $R = 2$, $S = 16$

$16 = k \times 2^2$

$\therefore k = 4$

(ii) $S = 4R^2$

(iii) If $R = 4$, $S = 4 \times 4^2$

$= 64$ m/s

(iv) If $S = 36$,

$36 = 4 \times R^2$

$9 = R^2$

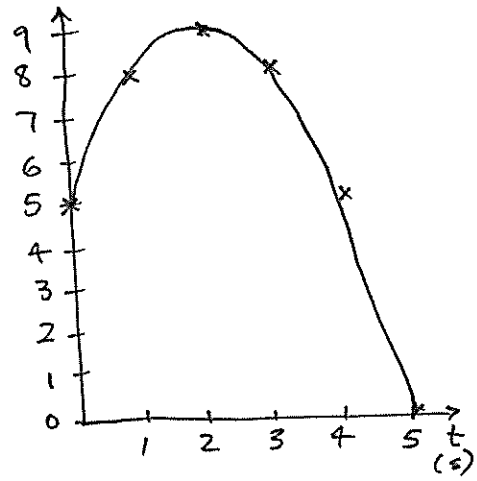
$\therefore R = 3$ cm

(c) $h = -t^2 + 4t + 5$

(i)

t	0	1	2	3	4	5
h	5	8	9	8	5	0

(ii)



(iii) Max. height = 9 metres

(d) ~~$12.50 per doll~~ (Accept $12.50)

(d) i) ≈ 9000 dolls

ii) $12.50 per doll

"$\frac{1}{2}$" for "1500" only

but full mark for "100" as it is the independent variable and defines the 1500.