

Section I

1	2	3	4	5	6	7	8
B	A	D	A	C	A	D	C

9	10	11	12	13	14	15	16
A	B	B	C	C	B	A	D

17	18	19	20	21	22
C	C	A	D	D	B

- Q1 B
- Q2 A
- Q3 $280 \times 4 \times (1 + 0.175) = 1316$ D
- Q4 A
- Q5 C
- Q6 Let \$ x be the price excluding GST.
 $(1 + 0.10)x = 22$, $x = 20$, GST = $22 - 20 = \$2.00$ A
- Q7 The weekly savings is **less than** $\frac{1}{4} \times 900 = 225$.
 Number of weeks required is **more than** $\frac{3600}{225} = 16$ D
- Q8 $\frac{12}{h} = \sin 50^\circ$, $h = \frac{12}{\sin 50^\circ} = 15.66$ cm C
- Q9 A
- Q10 $\frac{2}{7} \times \frac{2}{7} = \frac{4}{49}$ B
- Q11 Arc length = $r\theta = 3 \times \frac{60}{360} \times 2\pi = \pi = 3.14$ cm B
- Q12 C
- Q13 $5 \times 4 \times 3 = 60$ C
- Q14 $3x^2(x+8) + x^2 = 3x^3 + 24x^2 + x^2 = 3x^3 + 25x^2$ B
- Q15 $p \propto \frac{1}{V}$, $p = \frac{k}{V}$ A
- Q16 D

Q17 Same number in each year group: $10\% \times 1200 \div 6 = 20$.
 Stratified sample based on year groups:
 For year 10, $10\% \times 230 = 23$; for year 11, $10\% \times 150 = 15$.

C

Q18 Arithmetic sequence: $a = 6$, $d = 4$, $t_n = 486$.
 $486 = 6 + (n-1)4$, $n = 121$.

C

Q19 $B = 2\pi\left(R + \frac{T}{2}\right)$, $\frac{T}{2} = \frac{B}{2\pi} - R$, $T = \frac{B}{\pi} - 2R$. A

Q20 Difference in time = $\frac{115 + 80}{360} \times 24 = 13$ hours.

Perth time = 10.00 pm Wed + 13 hours = 11.00 am Thur. D

Q21 $25 - 5 = 2x - 6$, $2x = 26$, $x = 13$.
 Median = 13, interquartile range = $18 - 6 = 12$. D

Q22 In the 4th decile means between 30% and 40% of the cumulative frequency, i.e. between 15 and 20 of the cumulative frequency out of 50. This corresponds to exam marks between 55 and 60. B

Section II

Q23ai \$5000.

Q23aii Rose's. \$2000.

Q23aiii 1 year.

Q23bi Radius of hole = $3.78 + 1 = 4.78$ m.
 Volume of soil removed = $\pi r^2 h = \pi(4.78)^2(2) \approx 144$ m³.

Q23bii Number of hours = $\frac{90000}{7500} = 12$.

Q23biii Volume of water collected = $400 \times 0.020 = 8$ m³.
 Number of litres = $8 \times 1000 = 8000$ litres.

Q23ci Total captured in second stage = $\frac{18}{0.4} = 45$.

Q23cii Total population estimate $\approx \frac{24}{0.4} = 60$.

Q24ai Mean = $\frac{3+5+5+6+8+8+9+10+10+50}{10} = 11.4$.

Q24aii The mean decreases and the median remains the same.

Q24b $D = \frac{t}{3}$, $t = 3D = 3 \times 1.2 = 3.6$.

Q24ci $US\$150 = 5 \times US\$30 = 5 \times A\$40 = A\200
 $A\$800 = 8 \times A\$100 = 8 \times \text{€}60 = \text{€}480$.

Q24cii If the value of the euro falls, A\$100 can buy more than €60. \therefore the gradient increases.

Q24di Male students attending tend to be younger than female students.

Q24dii 64

Q24diii 30-39 age group: class centre = 34.5, frequency = 5.
 $34.5 \times 5 = 172.5$

Q24div The mean calculated from the grouped frequency distribution table is an estimation whilst the mean calculated from the original data is exact.

Q25a A marble is drawn at random from a bag containing 3 red and 1 blue marbles.

The probability that a red marble is drawn is $\frac{3}{4}$.

Q25b $\angle MJK = 90 - 75 = 15^\circ$.

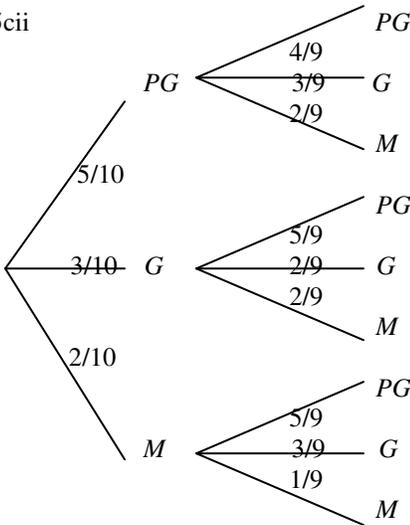
The sine rule: $\frac{20}{\sin \angle JMK} = \frac{18}{\sin 15^\circ}$, $\sin \angle JMK = \frac{20 \sin 15^\circ}{18}$,

$\angle JMK = 16.7129^\circ$.

$\angle KML = 75 - 16.7129 \approx 58^\circ$ is the angle of elevation from M to K.

Q25ci $\Pr(M) = \frac{2}{10} = \frac{1}{5}$.

Q25cii



Q25ciii $\Pr(\text{samerating}) = \frac{5}{10} \times \frac{4}{9} + \frac{3}{10} \times \frac{2}{9} + \frac{2}{10} \times \frac{1}{9} = \frac{14}{45}$.

Q25di $Z_1 = \frac{63-60}{6.2} \approx 0.484$, $Z_2 = \frac{62-58}{6.0} \approx 0.667$. No, do not agree.

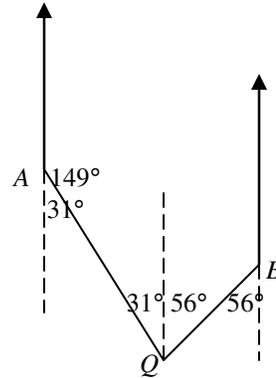
Q25dii $\Pr(X < 64) = 0.8413$, expected number = $150 \times 0.8413 \approx 126$.

Q26ai 2 hours 48 min = 2.8 hours. Speed = $\frac{15}{2.8} \approx 5$ km/h.

Q26aaii The cosine rule:

$$AB = \sqrt{15^2 + 10^2 - 2(15)(10)\cos 87^\circ} \approx 18 \text{ km.}$$

Q26aiii



Bearing of Q from B: S56°W or 236°T.

Q26bi Depreciation = $5000 - 3635 = \$1365$

% depreciation per year = $\frac{1365 \times 100\%}{5000 \times 3} = 9.1\%$.

Q26bii Taxable income = $800 \times 52 - \frac{1365}{3} = \41145 .

Q26biii

Tax payable = $4500 + (41145 - 28000) \times 0.30 = \8443.50 .

Q26c Value = $100(1.06)^{21} + 100(1.06)^{20} + \dots + 100(1.06) + 100$
 $= 100(1.06^{21} + 1.06^{20} + \dots + 1.06 + 1)$
 $= 100 \left(\frac{1.06^{22} - 1}{1.06 - 1} \right) = \$100 \left(\frac{1.06^{22} - 1}{0.06} \right)$.

Total interest = $100 \left(\frac{1.06^{22} - 1}{0.06} \right) - 100 \times 22 = \2139.23 .

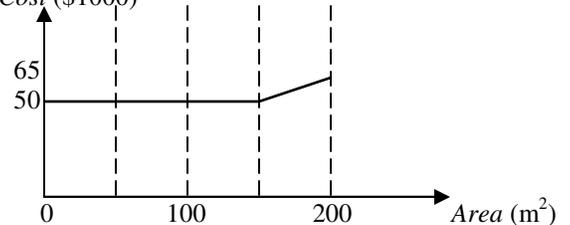
Q27ai Length $l = 10$ m, width $w = l - 6 = 4$ m.

Q27aaii Area $A = l(l - 6)$.

Q27aiii Width $w \leq 0$, impossible for a rectangle.

Q27aiv $l(l - 6) = 135$, $l^2 - 6l - 135 = 0$, $(l - 15)(l + 9) = 0$.
 Since $l > 6$, $\therefore l = 15$ m and $w = l - 6 = 9$ m.

Q27av Cost (\$1000)



Q27avi Company B: $360 \times 135 = \$48600$, \therefore Company B would charge less than Company A.

Q27bi Total purchase price = $6.00 \times 4 = \$24$.

Total annual running cost = $4 \times 5 \times 365 \times d = \$7300d$.

$\therefore \$c = \$(24 + 7300d)$.

Q27bii $\$(24 + 7300d) = \250 , $7300d = 226$, $d \approx 0.031$.

Q27biii No.

Total annual running cost = $4 \times 10 \times 365 \times d = \$14600d$.

$\therefore \$c = \$(24 + 14600d) = \$(24 + 14600 \times 0.031) = \476 . It is less than $2 \times 250 = \$500$.

Q27biv 97.5% will last up to $\mu + 2\sigma = 5000$ hours.

$\mu + 2 \times 170 = 5000$, $\mu = 4660$ hours.

Q28ai $\Pr(I) = \frac{10}{36} = \frac{5}{18}$.

Q28aaii

Difference	Result	Probability
0	Win \$3.50	$\frac{6}{36} = \frac{1}{6}$
1	Lose \$5	$\frac{5}{18}$
2, 3, 4 or 5	Win \$2.80	$1 - \frac{1}{6} - \frac{5}{18} = \frac{5}{9}$

Expectation = $3.50 \times \frac{1}{6} - 5 \times \frac{5}{18} + 2.80 \times \frac{5}{9} = \0.75 .

Q28aiii He expects to lose $1 - 0.75 = \$0.25$ for each game.

Q28b $H^2 = 2^2 + 2^2 = 8$.

Area of right-angled triangle = $\frac{1}{2} \times 2 \times 2 = 2$.

Area of regular hexagon = $2.598H^2 = 2.598 \times 8 = 20.784$.

Total area = $2 + 20.784 = 22.784 \text{ cm}^2$.

Q28ci

$A \approx \frac{3.6}{3}(5 + 4 \times 4.6 + 3.7) + \frac{3.6}{3}(3.7 + 4 \times 2.8 + 0) = 50.4 \text{ cm}^2$.

Q28cii Curved surface area

$\approx 7480.8 - 2 \times 50.4 - 5 \times 200 - 14.4 \times 200 = 3500 \text{ cm}^2$.

Please inform mathline@itute.com re conceptual, mathematical and/or typing errors.