

2021 NSW ESA Mathematics Standard 1 Solutions © itute 2021

Section I

1	2	3	4	5	6	7	8	9	10
B	A	D	D	A	C	A	C	B	B

Q4 $2467 \times \left(1 - \frac{15}{100}\right)^3 \approx 1515$

D

Q6 $74 - 85 = -11$

C

Q10 $180^\circ + 38^\circ = 218^\circ$

B

Section II

Q11 Option 1: \$1.50 per 100 grams

Option 2: $\frac{4.20}{3} = \$1.40$ per 100 grams

Option 3: $\frac{7.25}{5} = \$1.45$ per 100 grams

Q12 Program lasts for 10 hours.

Profit = $150 \times 20 - (110 + 52 \times (1 + 0.1)) \times 10 = 1328$ dollars

Q13 $1560 \times \frac{6.7}{100} \times \$1.45 \approx \$151.55$

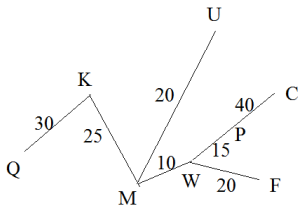
Q14 $2.45 \times \left(1 + \frac{3}{100}\right)^5 \approx 2.84$ dollars

Q15 time difference = $\frac{151 - 16}{15} = 9$ hours

When City A time is 5:00 pm Thursday, Sydney time (plus 9 hours) is 2:00 am Friday.

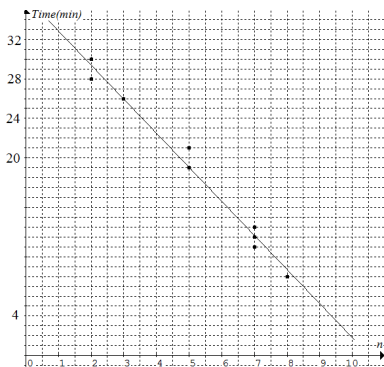
Q16 $2r = P - 10, r = \frac{P - 10}{2}$

Q17a Length = $30 + 25 + 20 + 10 + 15 + 20 + 40 = 160$



Q17b $45 + 20 = 65$ minutes

Q18a,b



Q18c Linear, negative, strong

Q18d Mean = $\frac{12 + 13 + 11}{3} = 12$

Q19a \$2000

Q19b After 5 years (60 months), value = \$8000

Q19c The model predicts zero value after 100 months and negative value beyond that, it is an unreasonable prediction. Depreciation by % p.a. of present value is a better model.

Q20a $\Pr(PN \cup PN \cup NP) = \frac{2}{6} \times \frac{1}{5} + \frac{2}{6} \times \frac{4}{5} + \frac{4}{6} \times \frac{2}{5} = \frac{3}{5}$

Q20b $\Pr(NN) = 1 - \frac{3}{5} = \frac{2}{5}$

Q21 1 cm \equiv 0.030 km, distance = $0.030 \times 26 = 0.780$ km

12 min = 0.20 h \therefore Average speed = $\frac{0.780}{0.20} = 3.9$ km per hour

Q22a Number of drops in 24 hours = $\frac{24 \times 60 \times 60}{4} = 21600$

Amount of water in 24 hours = $\frac{21600}{15} = 1440$ mL = 1.44 litres

Q22b Time required = $\frac{9}{1.44} = 6.25$ days or 150 hours

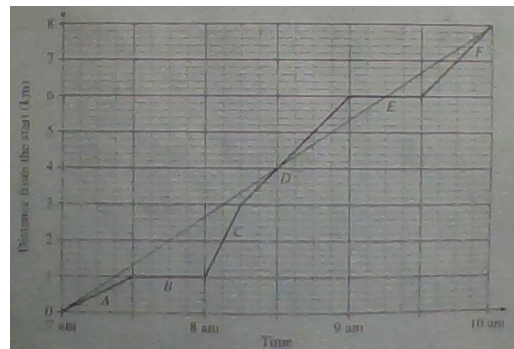
Q23a B, E

Q23b Fastest in section C: speed = $\frac{2 \text{ km}}{0.25 \text{ h}} = 8 \text{ km/h}$

Speed in section A = $\frac{1 \text{ km}}{0.5 \text{ h}} = 2 \text{ km/h}$

Speed in sections D, F = $\frac{2 \text{ km}}{0.5 \text{ h}} = 4 \text{ km/h}$

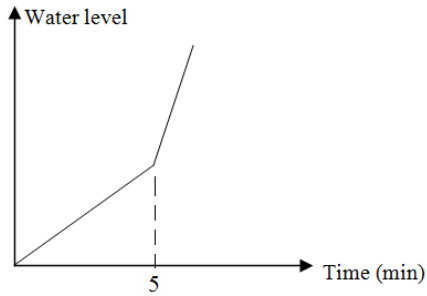
Q23c Between 8:30 am and 9:15 am



Q24a Internal length = 5.0 m, internal width = 3.6 m

Q24b Carpet area = $5.0 \times 3.6 - 1.6 = 16.4 \text{ m}^2$
Carpet cost = $\$40 \times 17 = \680

Q25



Q26 Area of the large shape = area of the small shape $\times 1.5^2$
 $= \left(9 \times 16 - \frac{1}{2} \times 16 \times 2.5 \right) \times 1.5^2 = 279 \text{ cm}^2$

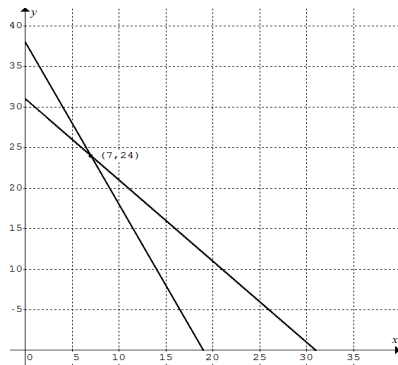
Q27a Interest for the month = $678833.09 \times 0.25\% = 1697.08$
 Amount owing end of month = $678833.09 + 1697.08 - 2866.91 = 677663.26$ dollars

Q27b The term of the loan will be reduced. Reduced monthly interest rate and the same monthly instalment result in a greater reduction in the amount owing at the end of each month. This is repeated every month. \therefore the loan will be paid off in less time.

Q28a $XY = 16 \cos 30^\circ \approx 13.86 \text{ cm}$

Q28b Area of $\triangle XYZ = \frac{1}{2} \times 13.86 \times 16 \sin 30^\circ \approx 55.4 \text{ cm}^2$

Q29 $4x + 2y = 76$



Number of goannas = 7 Number of emus = 24

Q30a Daily rate = $\frac{19.75\%}{365} \approx 0.05411\% = 0.0005411$

From 20 May to 31 May, there are 12 days.

Statement amount = $850 \times (1 + 0.0005411)^{12} \approx 855.5356$

Interest = $855.5356 - 850.00 \approx 5.54$ dollars

Q30b Minimum payment = $3\% \times 855.5356 \approx 25.67$ dollars

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