2020 NSW ESA Mathematics Standard 1 Solutions

Section I

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

Q1 C

Q2 A

Q3 D

Q4 C

Q5 A

Q6 D

Q7 $\frac{75}{50} = 1.5 \text{ h} = 1 \text{ h } 30 \text{ min}$ C

Q8 $200\left(1+\frac{3}{100\times 12}\right)^{18} \approx 209.19$ B

Q9 B

Q10 $C = 90 + 2\times 60t$ D

Section II

Q11i $\tan\theta = \frac{8}{10}$, $\theta \approx 39°$

Q11ii $x = \sqrt{8^2+10^2} \approx 12.8$

Q12 $100\times\frac{1500}{30} - 80\times\frac{1500}{25} = 200$ dollars

Q13 $A\left(1+\frac{3}{100}\right)^5 = 1000$, $A \approx 862.61$. He needs to invest more than \$863 approximately.

Q14a A slow increase in speed and distance in the first minute.
A faster increase in speed and distance in the next minute. Distance keeps on increasing in the last 2 minutes but the speed decreases and Adam comes to a stop at the end of the 4 minute duration..

Q14b

Q15 Tuesday 7 pm Melbourne time goes back $11+10=21$ hours is Monday 10 pm Honolulu time. 9 hours later it is Tuesday 7 am when the plane lands in Honolulu.

Q16 $m = 6 - \frac{3(10)}{2(10)-5} = 4$

Q17 Personal expenses per week $= 20\% \times 510 = 102$
Weekly savings $= 510 - 115 - 210 - 102 - 25 = 58$
Number of weeks required $= \frac{4930}{58} = 85$ weeks

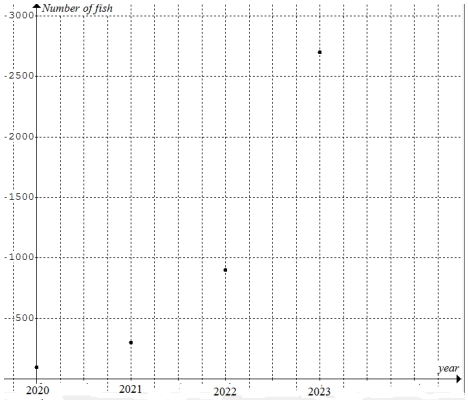
Q18 $d = 33$ m

2021	2022
300	900

$40^2 = 70^2 - 100d$,

Q19a

Q19b

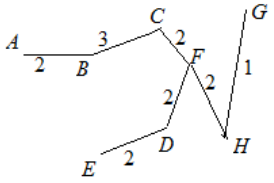


Q19c Between the two models, exponential model is more suitable.
The trend of the points is curving upwards, rising with increasing rate with time (years)
A linear model does not fit the dataset because the annual increment is not constant.

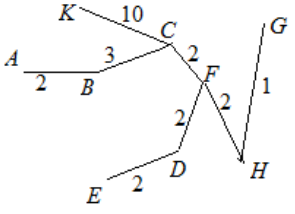
Q20a $2.5 = k(500)$, $k = \frac{2.5}{500} = 0.005$

Q20b $1.2 = 0.005N$, $N = 240$

Q21a Minimum length $= 2+3+2+2+1+2+2 = 14$



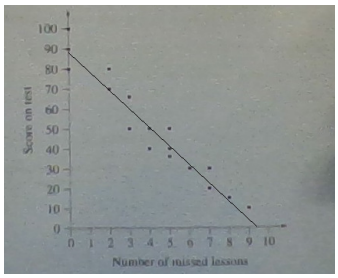
Q21b Minimum length $= 2+3+2+2+1+2+2+10 = 24$



Q22a $r \approx -0.9$, strong and negative

Q22b Range $= 100 - 80 = 20$

Q22c



Q22d Meg's estimated score ≈ 40

Q22e The dataset was for the students who sat the test. The line of best fit reaches zero score between 9 and 10 missing lessons.
It is not appropriate to use the line to make estimation for students who did not sit for the test.

Q23 According to the photocopy of the exam:

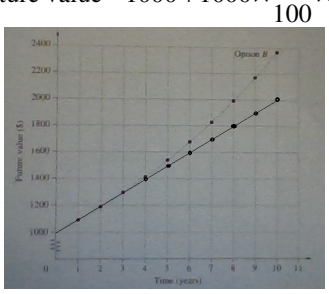
Length : width $= 76.7\text{mm} : 48\text{mm} = 12\,\text{m} : w$ $\therefore\ w = \dfrac{12 \times 48}{76.7} \approx 7.5\,\text{m}$

Total cost $= 12 \times 7.5 \times 100 = 9000$ dollars

Q24a Median age = 42 years
Only one person between 42 and 47.1 .

Q24b It is smaller. The ages are all 70 and the mean is 70 .: the deviation of each age from the mean is zero. Hence the standard deviation is zero.

Q25 Option A: Future value $= 1000 + 1000 \times \dfrac{10}{100} \times 8 = 1800$



Difference $= 2000 - 1800 = 200$ dollars

Q26a

		Die 1					
		1	**2**	**3**	**4**	**5**	**6**
Die 2	***1***	0	1	2	3	4	5
	2	1	0	1	2	3	4
	3	2	1	0	1	2	3
	4	3	2	1	0	1	2
	5	4	3	2	1	0	1
	6	5	4	3	2	1	0

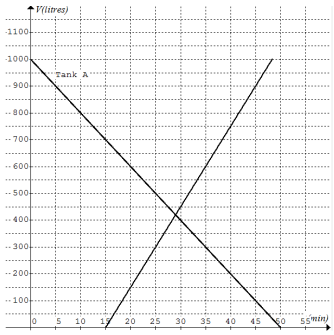
Q26b $P(\text{NOT } 0) = \dfrac{36-6}{36} = \dfrac{5}{6}$

Q27 $3000 \times 12 - (20797 + 0.37(122680 - 90000)) = 3111.40$ dollars

Q28 Area of $\Delta ABC = \dfrac{1}{2} \times 8 \times BC = 20$ $\therefore\ BC = 5$

$\therefore\ \dfrac{DE}{8} = \dfrac{4}{5}$, $DE = \dfrac{32}{5} = 6.4$, $DF = \sqrt{4^2 + 6.4^2} \approx 7.55\,\text{cm}$

Q29a



Q29b $t = 29$

Q29c $t = 45$, $V = 100 + 900 = 1000$

Q30 Interest charged for the third year $= 12056.71 \times \dfrac{6}{100} \approx 723.40$

Amount owing at the end of the third year
$= 12056.71 + 723.40 - 4510.53 = 8269.58$

Sale price $= 19000\left(1 - \dfrac{20}{100}\right)^3 = 9728$

Left over $= 9728 - 8269.58 = 1458.42$ dollars

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