NEW CENTURY MATHS 11 MATHEMATICS STANDARD (PATHWAY 2)

FULLY WORKED SOLUTIONS

Practice paper 4

Section 1

Question 1

0015

$\therefore$ A

Question 2

$\text{Mean} = \dfrac{(0+1+2+3+4+4+7)}{7} = 3$

$\text{Mode} = 4$

$\text{Median} = 3 \qquad (0 \ 1 \ 2 \ 3 \ 4 \ 4 \ 7)$

$\therefore$ Mean and median are same

$\therefore$ B

Question 3

Due south means on the same longitude.

$\therefore 147°\text{E}$

So, A or B, and if it is due south then it is below. So, it needs to be further south on the latitudes, i.e. greater than 9°S.

$\therefore$ B

Question 4

$\dfrac{BAC}{0.015} = \dfrac{0.062}{0.015}$

$\qquad = 4.133...$

$\qquad = 4 \text{ h } 8 \text{ min}$

$\therefore 10{:}30 \text{ p.m.} + 4 \text{ h } 8 \text{ min} = 2{:}38 \text{ a.m.}$

$\therefore$ A

Question 5

A: Mode = 12

Range = 12 − 8 = 4

B: Mode = 8

Range = 10 − 6 = 4

∴ Mode A is higher and ranges are the same.

∴ B

Question 6

Work backwards.

6:35 − 45 min = 5:50 a.m.

5:50 − 50 min = 5:00 a.m.

5:00 − 20 min = 4:40 a.m.

∴ A

Question 7

Time = 8 a.m. to 9 p.m.

$= 4 + 9$

$= 13$ hours

$$S = \frac{D}{T}$$

$$= \frac{1000 \text{ km}}{13 \text{ h}}$$

$= 76.92... \text{ km/h}$

∴ A

Question 8

Positively skewed → data grouped at end and then lessens. Tail goes to the positive direction.

∴ D

Question 9

6 p.m. − 10 h = 8 a.m. UTC without daylight saving time.

Since there is daylight saving, it is 1 hour forward.

8 a.m. + 1 hour = 9 a.m.

∴ D

Question 10

$720 is higher than all of the other wages. This means adding it will increase the mean and also the data will be more spread out, so the standard deviation will also increase.

∴ C

Section 2

Question 11

a   **i**   The first flight leaves Sydney at 8:55 a.m. and arrives in Christchurch at 1:55 p.m.

     ii $1355 - 200 = 1155$
           $1155 - 0855 = 3$ hours

     iii   There is no flight arriving in Christchurch at 10 a.m.
           The closest arrives at 0045 of the same day.
           She would need to get flight NC511 on Monday, which departs at 7:45 p.m.

b   **i**

Cumulative frequency
1
$1 + 14 = 15$
$15 + 26 = 41$
$41 + 7 = 48$
$48 + 2 = 50$

     ii   Mean = sum of all scores $\div 50$
$$= (0 \times 1 + 1 \times 14 + 2 \times 26 + 3 \times 7 + 4 \times 2) \div 50$$
$$= 95 \div 50 = 1.9$$

     iii   Range = highest − lowest
$$= 4 - 0 = 4$$

     iv
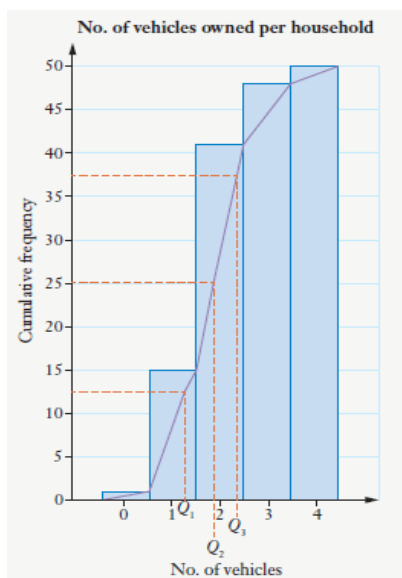
     v $\dfrac{3}{4} \times 50 = 37.5$ and $\dfrac{1}{4} \times 50 = 12.5$

           On the vertical axis read across from 37.5 and 12.5.
           $IQR = 2 - 1 = 1$

Question 12

a   **i** $BAC_{\text{female}} = \dfrac{10N - 7.5H}{5.5M}$

$= \dfrac{10 \times 5 - 7.5 \times 4}{5.5 \times 56}$

$= 0.06493...$

≈ 0.065

ii   Her BAC would have been lower.

b   **i** $D = S \times T$

$= 70 \text{ km/h} \times 1.2 \text{ s}$

$= 70 \text{ km/h} \times \dfrac{1.2}{3600} \text{ h}$

$= 0.02333... \text{ km}$

$= 23.33... \text{ m}$

$\approx 23 \text{ m}$

$\therefore$ His reaction distance was 23 m.

ii $d = kv^2$

$14 = k \times 70^2$

$k = \dfrac{14}{70^2}$

$k = 0.002857...$

$k \approx 0.0029$

iii $\therefore d = 0.0029v^2$

$= 0.0029... \times 90^2$

$= 23.14...$

$\approx 23.1 \text{ m}$

c   0   1   3   3   4 | 5   5   6   7   9

i   Mode = 3 and 5

ii Q_1 was middle of the bottom half of data = 3, Q_3 was middle of the top half of data = 6.
$\therefore IQR = 6 - 3 = 3$

iii $\sigma_X = 2.5709... \approx 2.57$

d   **i**   The 9th decile is equal to his weight. So, this means that he is at 90th percentile.
$\therefore$ 10% of boys have a higher BMI than Dylan.

ii   Median = 5th decile
$\therefore$ His BMI is 20.6.

Question 13

a **i** 70

ii The beginning of the box is $Q_1 = 50$ and the end of the box is $Q_3 = 65$.

$\therefore IQR = 65 - 50$

$= 15$

iii This is between the median and the lower quartile.

$\therefore 25\%$ of $124 = 0.25 \times 124 = 31$.

b **i** 788

ii $\dfrac{357}{2069} \times 100\% = 17.25...\% \approx 17.3\%$

iii More than double the number of male speeding drivers than female, due to more male drivers on the road, more males speeding (risky behaviour).

c

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MexC_____|_____Manilla
99°W         0°              121°E
−8 h        UTC             +8 h
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i Manila is $14°N$ whilst Mexico City is $5°$ higher at $19°N$.

$\therefore$ Manila is further south.

ii It's going back across the date line so it will be Monday.

iii Plane leaves Manila at 6 a.m. Tuesday

Add 19 h flight → 6 a.m. Tues + 19 h = 6 a.m. Tues + 12 + 7

$= 6$ p.m. Tues + 7

$= 1$ a.m. Wed

$\therefore$ Lands at Mexico City at 1 a.m. Wed Manila time.

To get to the International date line you add 4 hours to Manila time.

Then go back a day and add 4 hours to the time to get time in Mexico City.

$\therefore$ 1 a.m. Wed in Manila = 5 a.m. Wed at date line

→ change back to 5 a.m. Tuesday and then add further 4 hours

5 am Tues + 4 = 9 a.m. Tuesday.

$\therefore$ The plane arrives Tuesday at 9 a.m.