Calculator Prelim Revision 3 – Answers

1

Find the decimal multiplier $100\% + 3.7\% = 103.7\% = 1.037$

Use the formula for 4 years $130000 \times 1.037^4 = £150334.40$

Full marks can also be awarded for finding the increase year by year

2017 $130000 \times 1.037 = £134810$ 2018 $134810 \times 1.037 = £139797.97$

2019 £144970.49 2020 £150334.40

No marks will be given for adding 3.7% 4 times $130000 + 4 \times 4810 = £149240$

2

Order temperatures 8 9 10 11 **11** 12 13 14 17

Find median and quartiles Q_1 9.5 Median 11 Q_3 13.5

Find SIQR SIQR = $\frac{13.5-9.5}{2} = 2$

3

$\overrightarrow{QP} = \begin{pmatrix}-3\\-4\end{pmatrix}$ and $\overrightarrow{PR} = \begin{pmatrix}6\\-2\end{pmatrix}$, (a) $\overrightarrow{QR} = \overrightarrow{QP} + \overrightarrow{PR} = \begin{pmatrix}3\\-6\end{pmatrix}$,

(a) $\overrightarrow{MQ} = \frac{1}{2}\overrightarrow{RP} + \overrightarrow{PQ}$ or $\overrightarrow{MQ} = \frac{1}{2}\overrightarrow{PR} + \overrightarrow{RQ}$,

$\overrightarrow{MQ} = \frac{1}{2}\begin{pmatrix}-6\\2\end{pmatrix} + \begin{pmatrix}3\\4\end{pmatrix} = \begin{pmatrix}0\\5\end{pmatrix}$ $\overrightarrow{MQ} = \frac{1}{2}\begin{pmatrix}6\\-2\end{pmatrix} + \begin{pmatrix}-3\\6\end{pmatrix} = \begin{pmatrix}0\\5\end{pmatrix}$

4

Use the Sine Rule $\frac{\sin S}{17} = \frac{\sin 105}{26}$, rearrange $\sin S = \frac{17 \times \sin 105}{26}$,

calculate $S = \sin^{-1}(\frac{17 \times \sin 105}{26}) = 39.2°$

5

Calculate the volume of a sphere $V = \frac{4}{3} \times \pi \times (911.5)^3 = 3172185884$

Give your answer in the correct form $V = 3\ 200\ 000\ 000 = 3.2 \times 10^9 km^3$

6

Using points $(11,23)$ and $(17,35)$

The gradient of the line of best fit it $m = \frac{35-23}{17-11} = \frac{12}{6} = 2$

The equation of the line of best fit is $y = 2x + 1$

For a film score of 15, the sport score is $2 \times 15 + 1 = 31$

7

Mean is $\bar{x} = 960 \div 6 = 160\ cm$

$x - \bar{x}$	$(x - \bar{x})^2$
-11	121
-5	25
5	25
-1	1
0	0
12	144
$\sum$ 0	**$\sum$ 316**

x	x^2
149	22201
155	24025
165	27225
159	25281
160	25600
172	29584
$\sum$ 960	**$\sum$ 153916**

Standard deviation is

$$s = \sqrt{\frac{316}{5}} = 7.95\ cm$$

$$s = \sqrt{\frac{153916 - \frac{960^2}{6}}{5}} = 7.95\ cm$$

8

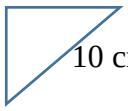
Calculate the linear scale factor $LSF = \frac{20}{14}$ $\left(\frac{10}{7}\right)$

Calculate the area scale factor $ASF = LSF^2 = \left(\frac{20}{14}\right)^2$

Calculate the area of the larger shape $Area = 26 \times \left(\frac{20}{14}\right)^2 = 53.1\ cm^2$

9

(a) Using SohCahToa



angle QPR is $2 \times \cos^{-1}\left(\frac{6}{10}\right) = 2 \times 53 = \mathbf{106}°$

This angle can also be calculated using Pythagoras and $\sin x = \frac{O}{H}$

(b) Calculate arc length Arc $= \frac{106}{360} \times \pi \times 20 = \mathbf{18.5\ cm}$

10

Set up an equation $113\% = 450.87$,

Calculate $100\% = 450.87 \div 113 \times 100 = \$399$

2 marks are available for using reverse percentages with an incorrect percentage, i.e.

$87\% = 450.87$, $100\% = 450.87 \div 87 \times 100 = \$518.24$

No marks will be given for subtracting 13% $£450.87 - 58.61 = = \$392.26$

$5x + 2y = 6$
$3x + 8y = 7$

Scale

$20x + 8y = 24$
$3x + 8y = 7$

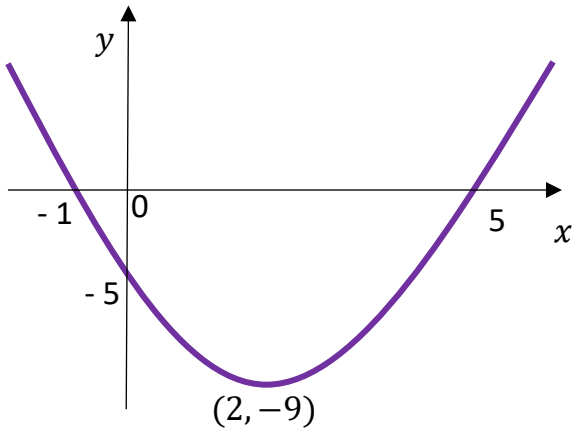
$17x = 17$, $\boldsymbol{x = 1}$, $\boldsymbol{y = \frac{1}{2}}$

12

x-intecepts at $(-1°, 0)$ and $(5, 0)$,

y-intercept at $(0, -5)$

Turning point at $(2, -9)$



13

Rearrange $\cos x = -\frac{4}{5}$, Two answers $x = 143.1°$ and $x = 216.9°$

14

$15a^3 \times 2a^5 \times \frac{1}{6}a^{-4} = 5a^4$

15

Form an equation $\frac{1}{4}(m^2 - 4m + 272) = 88$

Rearrange equal to zero $m^2 - 4m + 272 = 332$

$m^2 - 4m - 60 = 0$

Factorise and solve for m $(m - 10)(m + 6) = 0$

$m = 10,\ m = -6$

Only one valid answer $m = 10$, 10 months