Perth Academy National 5 Applications Homework 11

1.

OPQR,STUV is a cuboid relative to the coordinate axes.
M is the mid-point of OR.

N is the point on UQ such that $\text{UN} = \frac{1}{3}\text{UQ}$.

(a) Give the coordinates of R, S, T, U, V, M and N.

(b) Find $\overrightarrow{\text{VM}}$ in component form.

(c) Find $\left|\overrightarrow{\text{VM}}\right|$.

2. The rainfall (recorded in mm) in five different towns was as follows:

17 23 32 14 26

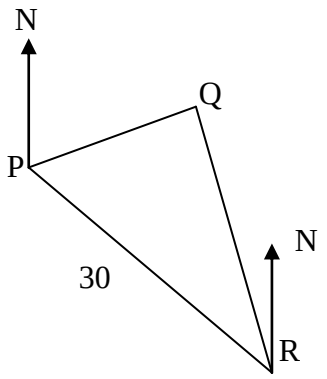
Calculate the standard deviation, correct to 1 decimal place.

3. The milk yield (in pints) from a sample of eight dairy cows was recorded.
It was found that $\sum x = 48$ and $\sum x^2 = 324$.

(a) Calculate the sample mean and standard deviation, to 1 decimal place where appropriate.

(b) Another sample had mean 4.9 pints and a standard deviation of 2.0.
Compare the two sets of results.

4. A ship, at position P, observes a lighthouse at position Q on a bearing of 065°.
The ship travels 30 km on a bearing of 125° to position R.
From position R, the ship observes the lighthouse on a bearing of 340°.
When the ship is at position R, how far is it from the lighthouse?



5. Simplify:

(a) $\sqrt{12}+\sqrt{3}$ (b) $\sqrt{98}-\sqrt{32}$ (c) $\sqrt{20}+\sqrt{80}$

6. Express with a rational denominator:

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{2}{\sqrt{5}}$ (c) $\sqrt{\frac{8}{24}}$

7. Evaluate:

(a) $8^{2/3}$ (b) $4^{3/2}$ (c) $27^{1/3}$ (d) $16^{-1/2}$

8. Evaluate, without a calculator:

(a) $1\cdot 5+0\cdot 5\times 3\cdot 8$ (b) $\frac{\frac{1}{3}+\frac{1}{4}}{\frac{1}{3}-\frac{1}{4}}$ (c) $\frac{5x}{y^2}-2z$ when $x=2, y=4, z=-3$.

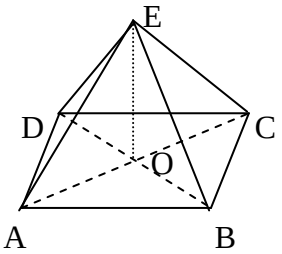
9. Jayne enters a two-part race.

(a) She cycles for 2 hours at a speed of $x+8$ kilometres per hour.
Write down an expression in x for the distance run.

(b) She then runs for 30 minutes at a speed of x kilometres per hour.
Write down an expression in x for the distance run.

(c) The **total** distance of the race is 46 kilometres.
Calculate Jayne's **running** speed.

10. The diagram below shows a square-based pyramid of side 200cm.
The edges AE, BE, CE and DE all measure 480cm.



(a) Find the length of diagonal AC.
(b) Find the height OE and hence find the volume of the pyramid.
(c) Find the size of $\angle$EAO.
(d) Find the size of $\angle$AEO.