St. Peter the Apostle High School

Mathematics Dept.

N5 Practice Prelim Eight Paper 2

Duration: 1 Hr 30 Mins **Marks: 50**

1. Attempt ALL questions.
2. You **MAY** use a calculator.
3. Write your solutions on the blank paper provided.
4. Full credit will be given only where the solution contains appropriate working.
5. Square-ruled paper will be provided if necessary.

Based on Credit Prelim 09/10

Formula Sheet

The roots of $ax^2 + bx + c = 0$ are $x = \dfrac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \dfrac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: Area = $\frac{1}{2} ab \sin C$

Volume of a sphere: Volume = $\dfrac{4}{3}\pi r^3$

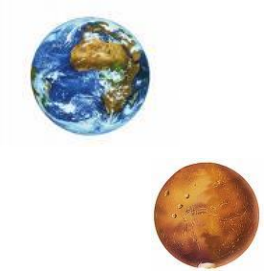
Volume of a cone: Volume = $\dfrac{1}{3}\pi r^2 h$

Volume of a pyramid: Volume = $\dfrac{1}{3}Ah$

Standard deviation: $s = \sqrt{\dfrac{\sum(x - \bar{x})^2}{n-1}} = \sqrt{\dfrac{\sum x^2 - (\sum x)^2 / n}{n-1}}$, where n is the sample size.

Marks

1. The distance between the earth and mars is on average approximately $1{\cdot}65\times10^{8}$ miles.



A spaceship has been designed to travel between the earth and mars at an average speed of 20 000 miles per hour.

How many days will the spaceship take to reach mars?
Give your answer correct to the nearest day. **4**

2. Solve the following equation giving your answer correct to **3 significant figures**.

$$3x^2 - 8x + 1 = 0\,.$$ **5**

3. A householder is adding an extra room to his house by building a room in the loft and adding a dormer window construction to the roof.

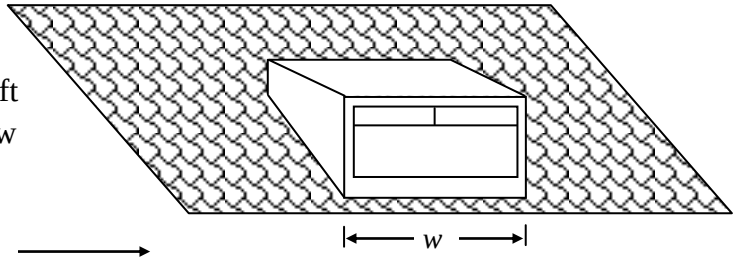


Diagram 1

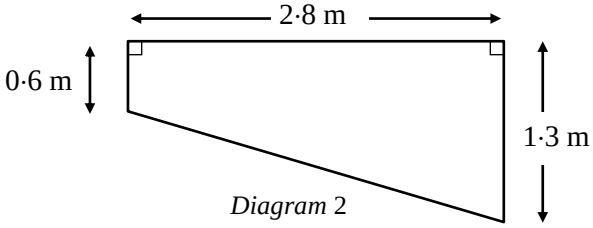


Diagram 2

The side cross-section of the structure is shown in *diagram* 2.

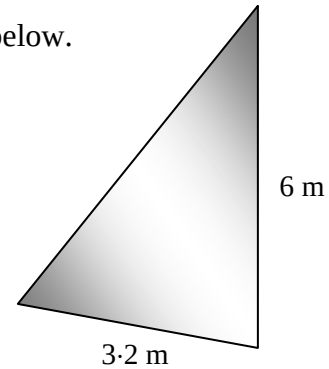
a) Calculate the area of the end cross-section. **3**

b) If the structure is a prism and has a volume of 9·31 cubic metres, calculate the width of the construction (marked *w* in *diagram* 1). **2**

4. A triangular sail designed for a racing yacht is shown below.

Two of its edges measure 6 metres and 3·2 metres.

Given that the sail has a **perimeter** of 15·5 metres, calculate the **area** of the sail.



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Marks

5. **a)** A function is given as $f(x) = \frac{6}{\sqrt{x}}$, where $x > 0$.

Find the exact value of $f(18)$, giving your answer as a **surd in its simplest form** and with **a rational denominator**. **4**

b) Express $\frac{p^5 \times 8p}{2p^{-3}}$ in its simplest form. **2**

6. A concert hall sells two types of tickets, stall tickets and balcony tickets.

When **all** seats are sold the concert hall holds a total of 640 people.

a) Let ***s*** be the number of stall tickets and ***b*** the number of balcony tickets.

From the information above write down an equation connecting ***s*** and ***b***. **1**

b) On a particular night a concert is sold out (all seats are taken) with stall tickets priced at £8.50 and balcony tickets at £12.20.

The total takings at the box office for that night was £6143.

From this information write down a second equation connecting ***s*** and ***b***. **1**

c) Hence find how many stall and balcony seats are in this concert hall. **3**

7. An international perfume manufacturer prices their bottles of perfume **by volume**.

The two bottles below, although containing different volumes, are mathematically similar in shape. Their heights and prices are shown.

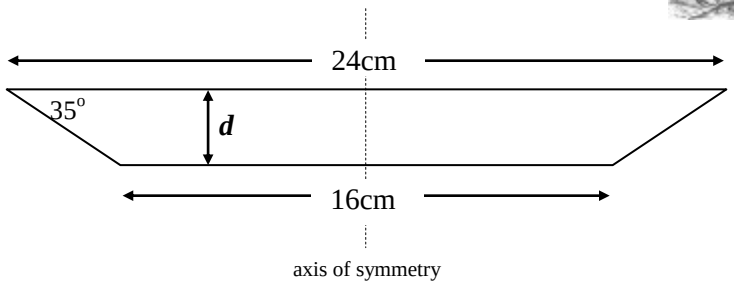
The larger of the two bottles is for sale in France.

Assuming the smaller bottle to be priced correctly, determine whether or not the larger bottle has the correct price tag given that the exchange rate is £1 = 1·10 euros. **4**

Marks

8. An old mill's water wheel has to be refurbished with all of the wheel's water troughs being replaced.

The cross-section of one of the proposed new troughs is shown below.



It is known that the depth (***d***) of the trough must be **at least** 3cm.
Is this proposed trough acceptable? **4**

9. Bob gets a 4% pay rise in 2009 to take his annual wages to £24000

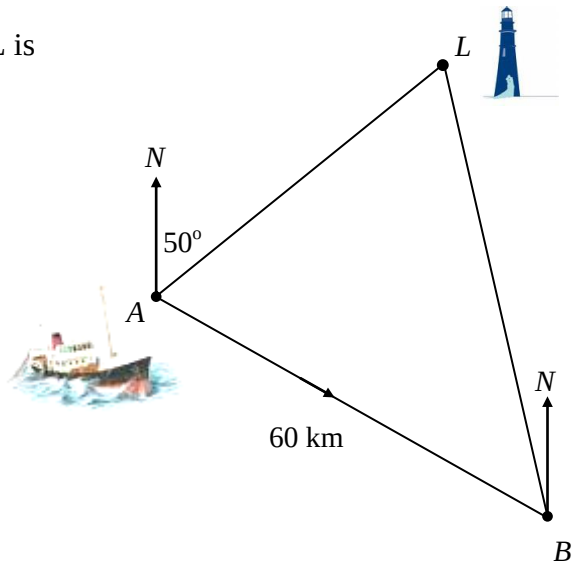
How much did Bob get paid in 2008, before his pay rise.
Give your answer correct to 3 significant figures. **3**

10. A ship is at position A. Lighthouse L is on a bearing of 050° from the ship.

The ship then travels 60 kilometres on a bearing of 130° to position B.

From position B the captain now observes the lighthouse on a bearing of 340°.

Calculate the distance between the ship and the lighthouse when the ship is at position B.



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11. An extract from a ferry brochure is shown below.
Prices are for single crossings to Le Havre.

Fares include 2 adults	Economy fare (single)	Flexi fare (single)
Cars up to 4m long	£49 + £2 for each additional or part metre	£59 + £3 for each additional or part metre
Bicycles	£30	£30
Motorhome/minibus up to 6m long	£65 + £5 for each additional or part metre	£75 + £7 for each additional or part metre
Motorcycle/scooter	£35	£45
Vans	£85	£75
Caravans (including cars)	from £91.00*** (day sailing) from £133.00*** (overnight sailing)	from £101.00*** (day sailing) from £143.00*** (overnight sailing)
Each additional adult	£11	£12
Each child (4-15 years)	£5	£5
Infants (0-3 years)	Free	Free
Pets	£9	£11

a) How much would Mr & Mrs Brown and their 12 year old daughter pay for a single economy crossing for themselves and their 8 metre long motorhome? **1**

b) A number of adults plus their pet dog in a car which is 4·2 metres long are charged £97 for a single Flexi fare crossing.

How many adults are in the car?
Your answer must be accompanied by appropriate working **3**

Total Marks: 50

End of question Paper