



Practice Paper B

Paper 2 – Calculator

Total Marks – 60

Attempt ALL questions.

You may NOT use a calculator.

Full credit will only be given to solutions which contain appropriate working.

State the units for your answers where appropriate

Write your answers clearly in the space provided in this booklet.

FORMULAE LIST

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

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{(b^2 + c^2 - a^2)}{2bc}$

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

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

Volume of a cone: $V = \frac{1}{3}\pi r^2 H$

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

Standard Deviation $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}}$

Or $s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$, where n is the sample size.

1. Solve algebraically

$$\frac{2(3x - 1)}{5} = 6$$

3

2. Write $y = x^2 + 4x - 7$ in the form $y = a(x + p)^2 + q$.

3

3. Change the subject of the formula to h

$$g = 3h^2 + 5$$

4. Find the roots of

$$y = 3x^2 - 5x - 4$$

Given your answer to 1 decimal place.

5. A spherical metal ball has a radius of 6.8cm .

(a) Find the volume of this sphere

2

(b) The sphere is melted and reshaped into a cone with a radius of 5cm . Assuming the volume remains consistent, calculate the height of the cone.

3

6. Solve $3 \cos x - 2 = -1$ where $0 \leq x \leq 360^\circ$

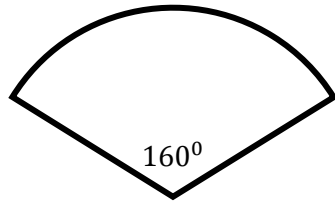
7. Kyle Industries purchase a new tractor for £85 000. The owners will only consider selling the tracker when the value falls below half the purchase value.

The tracker depreciates at 18% per annum.

After how many years will the owners consider selling the tracker based on its value.

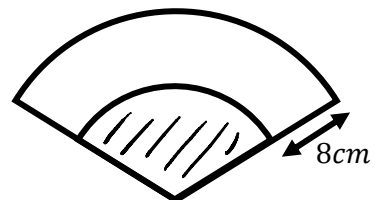
8. A fan is created by cutting a sector from a circular piece of material. The radius of the circle used is 20cm .

(a) Find the area of the sector used to make the fan.



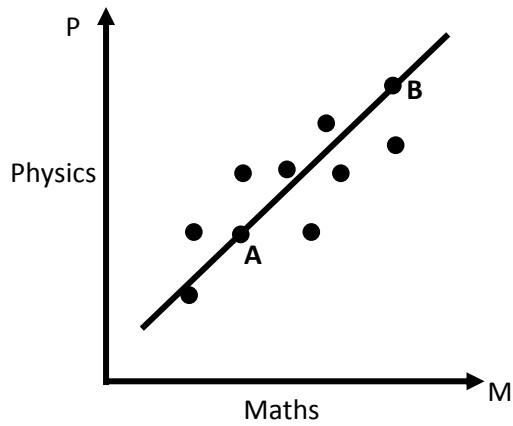
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(b) Part of the sector is cut out and red taping is put around the edge of the material. Calculate the length of material used.



5

9. The following graph shows the correlation between marks achieved in recent Maths and Physics assessments and a line of best fit is draw.



Pupil A achieved 30% in their maths assessment and 42% in their Physics assessment.

Pupil B achieved 90% in their maths assessment and 82% in their Physics assessment.

(a) Find the equation of the line of best fit in terms of M and P .

3

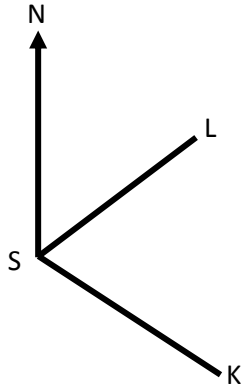
(b) Use this equation to estimate the maths mark if a pupil achieved 60% in their Physics paper.

1

10. Show that

$$(\sin x + \cos x)(\sin x - \cos x) = 2 \sin^2 x - 1$$

11. Lisa walks 8 km on a bearing of 60° and Karen walks 10km on a bearing of 110°



(a) Calculate how far apart Lisa and Karen.

4

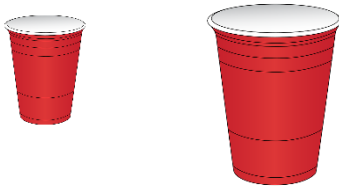
(b) Karen decides to go and meet Lisa. What bearing will Karen need to travel in order to walk in a straight line to meet Lisa.

4

12. The two cups below are mathematically similar.

The smaller cup has a height of 7cm and a volume of 200ml.

The larger cup has a volume of 1.6l.



Calculate the height of the larger cup.

3

15. Find $|2a + b|$ where $a = \begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix}$ and $b = \begin{pmatrix} -1 \\ 6 \\ -2 \end{pmatrix}$. Give your answer to 2 decimal places.

3

13. Alex has decided to change his savings account. He will choose between the two accounts

The Royal Bank of Santander 2.3% on all balances.	BTS 1.5% for the first year and then 3% for all subsequent years.
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(a) How much interest will he received if he invests £6000 for 2 years in The Royal Bank of Santander.

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(b) How long will Alex need to leave his money in BTS to have a better return than The Royal Bank of Santander.

4

END OF PAPER