



Master Coaching
Ph: 1800 TUITION
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Year 12 2 Unit Advanced

Test #4

Time allowed : Two hours (Plus 5 minutes reading time)

Directions to candidates:

- * Attempt ALL questions.
- * ALL questions are of equal value.
- * All necessary working should be shown in every question.
Marks will be deducted for careless or badly arranged work.
- * A standard integral sheet will be provided.
- * Board approved calculators may be used.
- * Each question attempted is to be returned on a separate sheet of paper clearly marked question 1, question 2, etc. at the top of the page.



QUESTION 1 (Start a new page).

- a Find correct to two decimal places, the value of $\frac{3\sqrt{54 \cdot 2}}{12 \cdot 3 - \pi^2}$
- b Simplify : $\frac{3}{a-1} + \frac{2}{a+1} - \frac{4a}{a^2-1}$
- c Solve $3(x-4)+20=5x$
- d Factorise completely : $5xy^2 - 20x$
- e Solve the pair of simultaneous equations : $3x+y=13$ and $4x-y=22$
- f Find the perimeter of a semicircle of radius $4 \cdot 2$ cm.

QUESTION 2 (Start a new page).

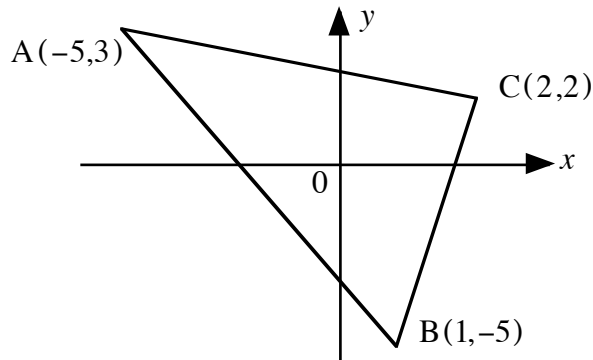
- a Find the first derivatives of :
- | | | | |
|-----|----------------------|----|------------------------|
| i | $y = e^{x^2+3}$ | ii | $y = \frac{3x}{x^2+3}$ |
| iii | $y = \frac{5}{3x^2}$ | iv | $y = 2x^4 \sqrt{5x-4}$ |
- b Shade in the region common to $y \geq x^2 - 4$ and $y \leq x - 2$

QUESTION 3 (Start a new page).

- a A field is triangular, with two sides of 80 metres and 40 metres enclosing an angle of 130°
- Calculate the area of the field.
 - Use the cosine rule to calculate the length of the third side to the nearest metre.
- b The moon has a diameter of 3500km.
An astronaut observes that the moon subtends an angle of 1° at her eye.
Calculate the approximate distance of the astronaut from the moon.



QUESTION 4 (Start a new page).



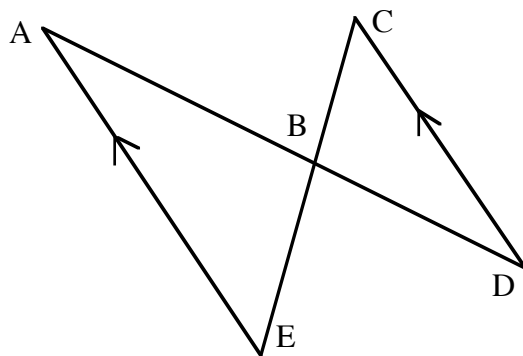
- a Copy the diagram onto your paper.
- b Calculate the length of BC.
- c Find the gradient of AB.
- d Show that the equation of AB is $4x + 3y + 11 = 0$

The line through C perpendicular to AB meets AB at N.

- e Find the perpendicular distance from C to AB
- f Find the equation of CN
- g Find the coordinates of N.
- h By using part e, or otherwise, calculate the area of triangle ABC.

QUESTION 5 (Start a new page).

a



In the diagram AE is parallel to CD

- i Prove that $\triangle ABE$ is similar to $\triangle CBD$
- ii Find the length of BE if
 $AE = 34\text{cm}$, $BC = 21\text{cm}$,
 $CD = 24\text{cm}$, and $BD = 30\text{cm}$.

Give reasons.

- b ABCD is a square. X and Y are points of BC and CD respectively such that $BX = CY$.
Prove that : i $AX = BY$ ii AX is perpendicular to BY



QUESTION 6 (Start a new page).

- a**
- i** Find the period and amplitude of the function $y = 2 + 4\sin 3x$
 - ii** Sketch the curve $y = 2 + 4\sin 3x$ for $-\pi \leq x \leq \pi$
- b** The third term of an arithmetic progression is 2 and the eleventh term is 44.
- i** Find the first term a , and the common difference d .
 - ii** Find the sum of the first twenty five terms of this series.
- c** Two cards are drawn successively at random (without replacement) from a standard pack of 52 playing cards.
- i** What is the probability that both cards are clubs ?
 - ii** What is the probability that both cards are the same suit ?

QUESTION 7 (Start a new page).

- a** Find the area between the curve $y = 2x^2$ and the straight line $y = 3x + 2$
- b** Evaluate $\int_2^6 2^x \cdot dx$ by using Simpson's Rule with two strips.
- c** Given that $3x^2 + 6x - 4$ has roots α and β ,
- find the value of : **i** $\alpha + \beta$ **ii** $\alpha\beta$ **iii** $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$