

WR 2003

QUESTION 2 (12 MARKS) Use a SEPARATE Sheet of Paper

(a) Solve $|2x + 6| \leq 10$

(b) Give the exact value of $\log_2\left(\frac{1}{\sqrt{2}}\right)$

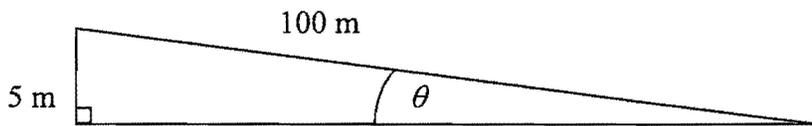
(c) (i) Find $\frac{d}{dx}(2x^3 - 3x^2)$

(ii) Find the equation of the normal to $y = 2x^3 - 3x^2$ at the point where $x = -1$

(d) Find the values of a and b such that :

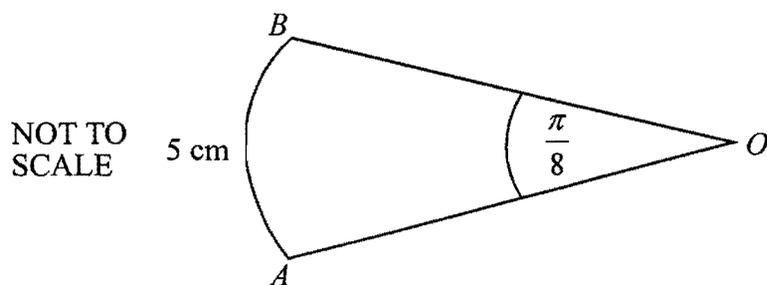
$$\begin{cases} 2a - 3b = 7 \\ a - 4b = 1 \end{cases} \text{ and}$$

(e) Christopher wheels his chair 100 metres up an inclined ramp, which takes him from ground level to a podium which is 5 metres above the ground. At what angle is the ramp inclined to the ground? (Answer to the nearest minute.)



(f) Find the area (as an exact value) of a minor segment which subtends an angle of $\frac{\pi}{3}$ radians at the centre of a circle with 6 m radius.

(a)



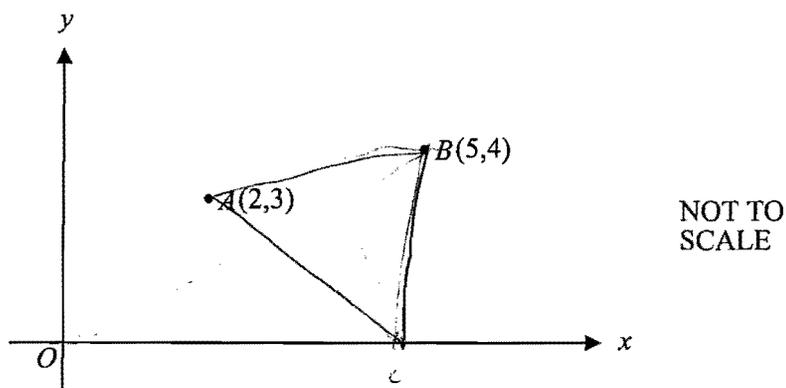
In the diagram, AB is an arc of a circle with centre O . The length of the arc AB is 5 cm and angle AOB is $\frac{\pi}{8}$ radians. Find the length of AO .

2

(b) Two fair dice are thrown simultaneously. One of the dice is red and the other is black. What is the probability that exactly one 3 is thrown?

2

(c) The diagram shows the points $A(2,3)$ and $B(5,4)$.



(i) Show that the equation of AB is $x - 3y + 7 = 0$.

2

(ii) Find the coordinates of M , the midpoint of AB .

1

(iii) Show that the equation of the perpendicular bisector of AB is $3x + y - 14 = 0$.

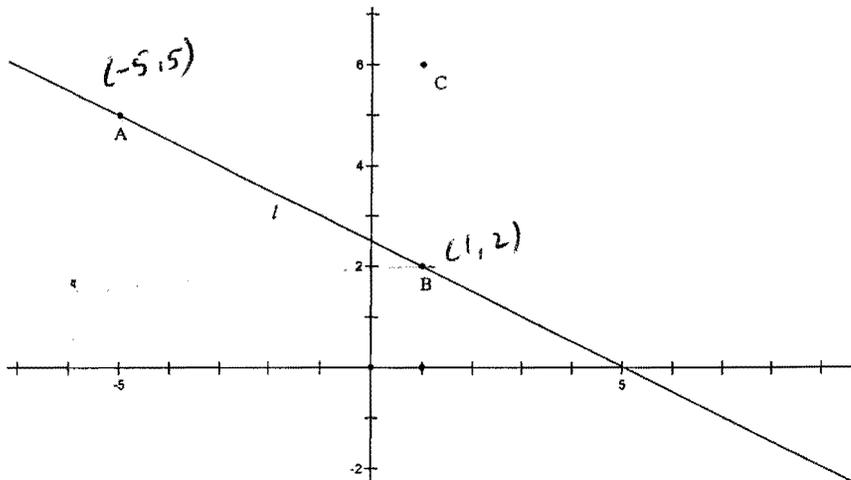
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(iv) The perpendicular bisector of AB cuts the x -axis at C . Find the coordinates of C .

1

(v) Find the area of triangle BCO .

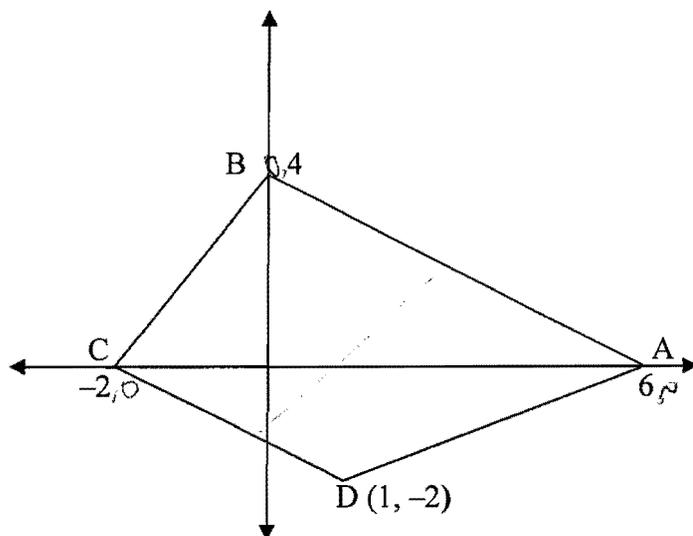
2



The line l contains the points $A(-5, 5)$ and $B(1, 2)$.

$C(1, 6)$ is another point which is not on the line l .

- (a) Calculate the distance AB . 2
- (b) Find the gradient of AB and hence, the acute angle the line AB makes with the x -axis. 2
- (c) Show that the equation of the line AB is $x + 2y - 5 = 0$. 2
- (d) Find the perpendicular distance of C from l . 2
- (e) Use your answers from a) and d) to show the area of $\triangle ABC = 12u^2$. 1
- (f) Show how you can calculate the area of $\triangle ABC$ in another way. 1
- (g) A fourth point D forms a parallelogram with A , B and C . 2
- Write all the possible positions of D .



ABCD is a Trapezium as shown in the diagram above. The equation of the line passing through AB has equation $2x + 3y - 12 = 0$.

The coordinates of the point D are $(1, -2)$.

- | | | |
|-----|---|---|
| (a) | What acute angle does the line AB make with the positive x -axis?
Give your answer to the nearest degree. | 2 |
| (b) | Find the mid point (M) of the interval AB? | 1 |
| (c) | Show that the equation of the line CD is given by $2x + 3y + 4 = 0$. | 2 |
| (d) | Show the shortest distance from the point M to the line CD
is equal to $\frac{16\sqrt{13}}{13}$ units. | 2 |
| (e) | Show that CD is parallel to AB. | 1 |
| (f) | Given that CD is 5 units, calculate the distance AB and hence
find the area of the trapezium ABCD. | 2 |
| (g) | Give the equation of the circle, in the form $(x - a)^2 + (y - b)^2 = r^2$,
with centre M having CD as tangent. | 2 |

WR 2007**Question 2** (12 marks) Begin a SEPARATE sheet of paper**Marks**

(a) Differentiate

(i) $\log_e(x^2 - 3x)$

1

(ii) $x^{\frac{1}{2}}$

1

(iii) $\frac{2x-1}{\cos x}$

2

(b) Integrate

(i) $\int \cos\left(\frac{x}{2}\right) dx$

2

(ii) $\int_0^1 \frac{1}{6} e^{3x} dx$ leave your answer in exact form

3

(c) Find y if $\frac{dy}{dx} = 2 \cos 2x$ and $y = 3$ when $x = \frac{\pi}{4}$

3

Trialmath 2008**Question 2** (12 marks) Use a SEPARATE page/ booklet.**Marks**(a) Differentiate with respect to x :

(i) $\cos(2x^3 + 1)$

2

(ii) $e^{\frac{x}{3}}$

1

(b) Find $\int_0^{e^2-1} \frac{3}{x+1} dx$

3

(c) Consider the function $f(x) = \sqrt{25 - x^2}$

(i) Write down the domain of the function

2

(ii) Write down the range of the function

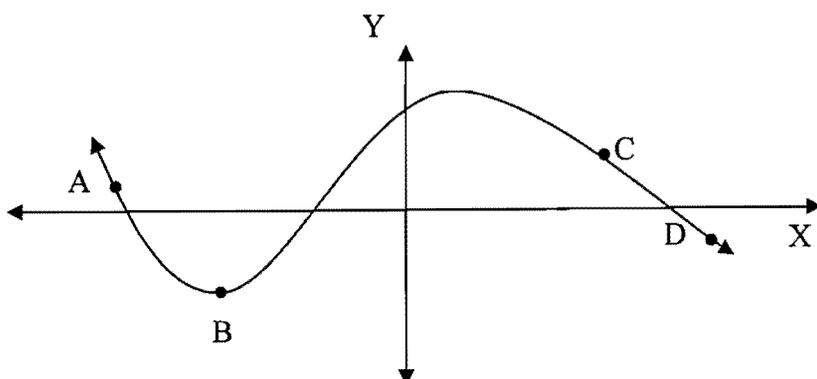
1

(d) If $y = \ln\left[\frac{1-x}{1+x}\right]$ show that $\frac{dy}{dx} = \frac{-2}{1-x^2}$

2

(e) State which point(s) on the following diagram relates to the following description.

$$y > 0, \frac{dy}{dx} < 0, \frac{d^2y}{dx^2} > 0$$



1

WR 2008

Question 2 (12 marks) Use a SEPARATE writing booklet.

Marks

a) Differentiate with respect to x

(i) $2x^3 + x^{-3}$ 2

(ii) $\frac{1}{e^{2x}} - \sin x$ 2

b) (i) Find $\int \sec^2 x - e^{4x} dx$ 2

(ii) Evaluate $\int_1^e x^2 + \frac{2}{x} dx$ 3

c) Find the area enclosed by the curve $y = 2 \cos 3x$, the line $x = \frac{\pi}{12}$ and the x and y axes. 3

Trialmath 2009

Question 2 (12 marks) Use a SEPARATE page/ booklet.

Marks

(a) Given the points A(1,2), B(3,1), C(-1,4)

(i) Find the equation of the line BC. 1

(ii) Find the perpendicular distance from point A to the line BC. 2

(iii) Hence, or otherwise, find the area of $\triangle ABC$. 2

(b) Find the sum of the first 15 terms of the series

$$1 + 3 + 3^2 + 3^3 + 3^4 + \dots \quad \text{2}$$

(c) Find the maximum area a triangle can have if the sum of its base and height is 10cm. 3

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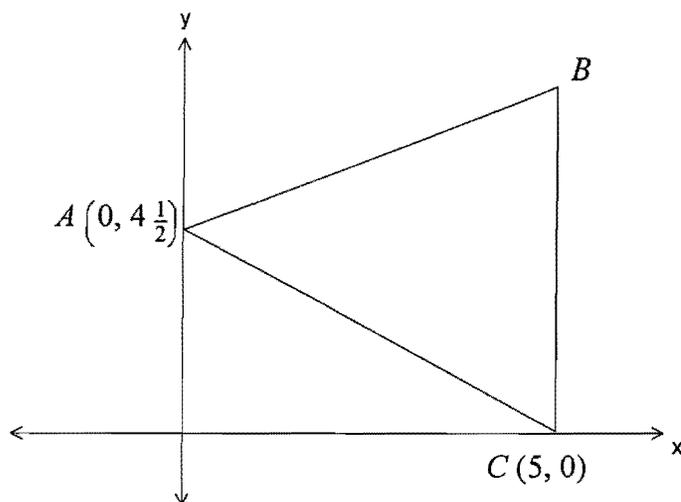
(d) The area of a sector AOB of a circle centre O, radius 4 cm is 28 cm^2 . Find the length of the minor arc AB. 2

WR 2009

Question 2 (12 Marks)

Use a Separate Sheet of paper

Marks



The lines AB and CB have equations $x - 2y + 9 = 0$ and $4x - y - 20 = 0$ respectively.

(h) Find the coordinates of the point B . 2

(i) Show that the equation of the line AC is $9x + 10y - 45 = 0$. 2

- (j) Calculate the distance AC in exact form. 2
- (k) Find the equation of the line perpendicular to BC which passes through A . 2
- (l) Calculate the shortest distance between the point B and the line AC . Hence find the area of the triangle ABC . 2
- (m) State the inequalities that together define the area bounded by the triangle ABC . 2