MINISTRY OF EDUCATION AND HIGHER EDUCATION

FORM FOUR EXAMS, 2011

MATHEMATICS

P/LAND NATIONAL EXAMINATION BOARD

Name.....

School.....

Roll Number.....

Puntland State of Somalia

Ministry of Education

Puntland National Examination Board

Form 4

MATHEMATICS

June 2011

Time 2 hours

Plus 10 minutes before the exam for reading through the paper

TOTAL TIME 2 hours 10 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of 18 printed pages.
Count them now. Inform the invigilator if there are any missing.

PART ONE (10 Multiple choice questions):	10 marks
PART TWO (12 Structured questions):	90 marks
TOTAL	100 marks

- Answer ALL questions.
- All answers and working must be written on this paper in the spaces provided immediately after each question.
- Rough work can be done on page 2, 3 and 4. This will not be marked
- No extra paper is allowed.
- No calculators are allowed.
- If you make a mistake cross out the incorrect answer clearly and write your correct answer.

Use this page for rough work, it will not be marked

Use this page for rough work, it will not be marked

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PART 1: Multiple Choice questions. Circle the correct answer. 1 mark each.

1. The distance from the Earth to the moon is 250 000 miles. What is this number in standard form?

A). 250×10^3 B). 2.5×10^4

C). 25×10^4 D). 2.5×10^5

2. What is the value of the expression below? $4(3 + 7 - 12) - (-3)^2$

A) - 17 B) - 2 C) 1 D) 11

3. Solve: 3(x += 5) 2x + 35

Step 1: 3x +15 = 2x + 35

Step 2: 5x +15 = 35

Step 3: 5x = 20

Step 4: x = 4

Which is the first **incorrect** step in the solution shown above?

A) Step 1 B) Step 2 C) Step 3 D) Step 4

4. The ages, in years, of the six students in a cooking class are shown below.

14, 16, 20, 18, 14, 14

What is the mean age, in years, of the students?

A) 14 B) 15 C) 16 D) 19

5. The total cost (c) in dollars of renting a sailboat in Eyl for n days is given by the equation c = 120 +60n. If the total cost was $360, for how many days was the sailboat rented?

A) 2 B) 4 C) 6 D) 8

6. The expression $6\sqrt{50} + 6\sqrt{2}$ written in simplest radical form is

A) $6\sqrt{52}$ B) $12\sqrt{52}$ C) $17\sqrt{2}$ D) $36\sqrt{2}$

7. If $S(t) = t^2 - 5t + 8$, what is the rate of change of S with respect to t when t = 3?

A) - 5 B) 1 C) 2 D) 9

8. A bag contains eight green marbles, five white marbles, and two red marbles. What is the probability of drawing a red marble from the bag?

A) $\frac{1}{15}$ B) $\frac{2}{15}$ C) $\frac{2}{13}$ D) $\frac{13}{15}$

9. What is the *n*th term in the following sequence of numbers? 2, 5, 10, 17, 26, 37.

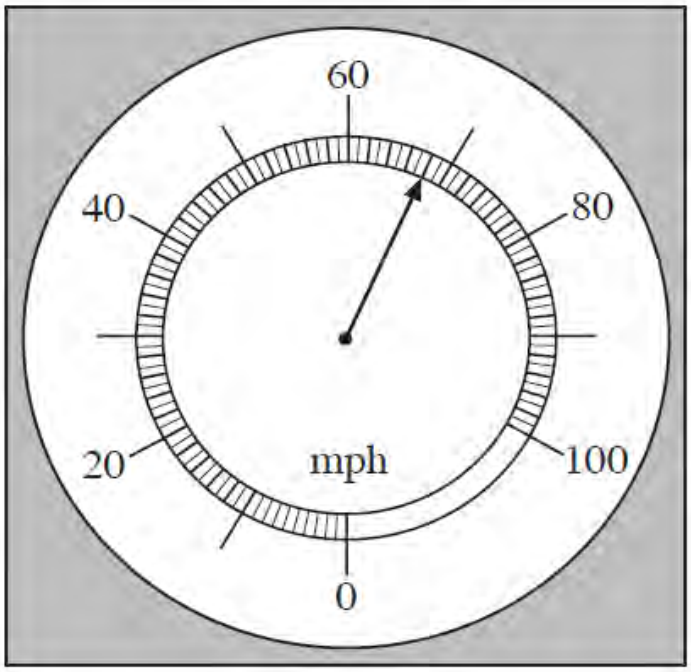
A). $n^2 - 1$ B). $2n^2$ C). $n^2 + 1$ D). $(9n - 1)^2$

10. If log 2 ≈ 0 301 and log 3 ≈0 477 , what is the approximate value of log 72?

A) 0.051 B) 0.778 C) 0.861 D) 1.857

QUESTION 1: (12 Marks)

1. *(a)* The diagram shows a car speedometer.



(i) What speed is shown on the diagram?

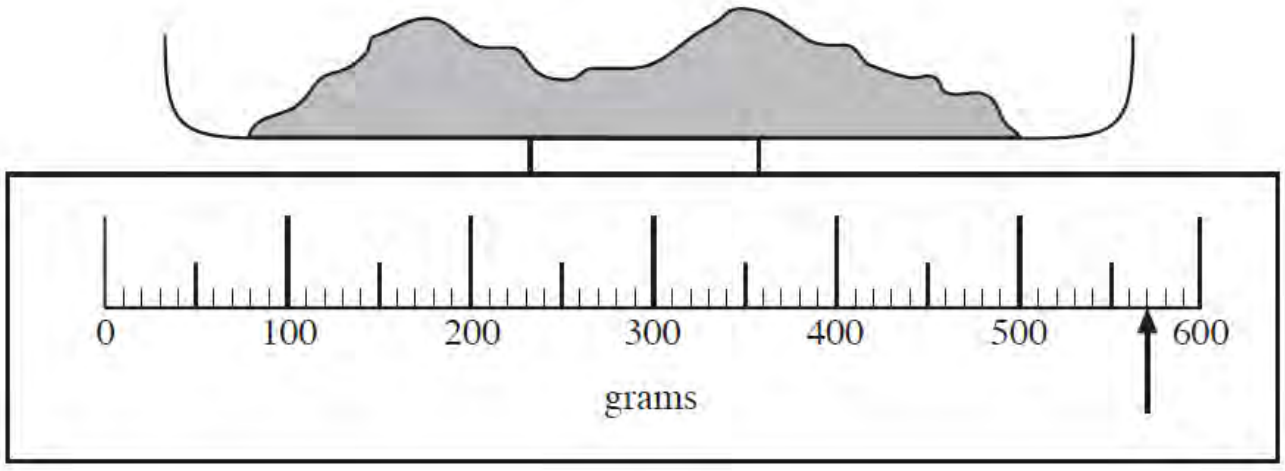
speed = ... m.p.h.

(ii) Draw a pointer on the diagram showing a speed of 56 m.p.h.

(2marks)

(b) A kitchen scales is used to weigh one of the ingredients for a cake.

What weight is shown on the scales?

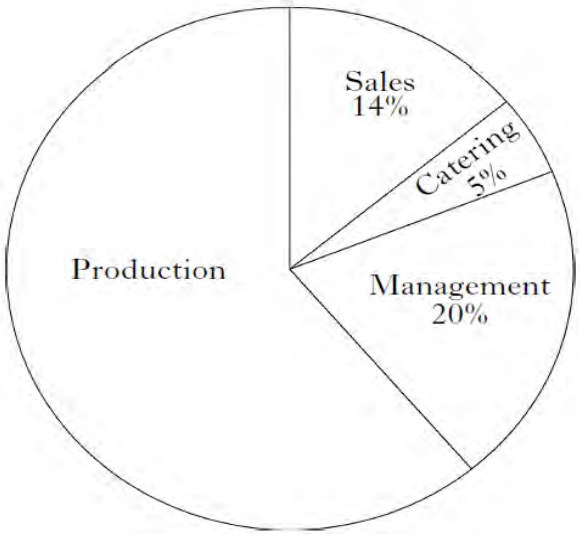


i) Weight ..... grams

ii) What is this weight in kilograms? .....

(2marks)

c) This pie chart shows the different types of staff employed by a Garowe company.



(i) What percentage of the staff work in production?

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.....(1 mark)

(ii) 1200 people work for the company. How many of them work in sales?

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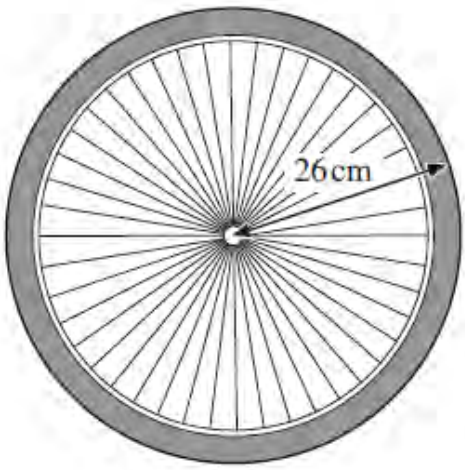
..... (2 marks)

d) A wheel, including the tyre, has a radius of 26 cm. (3 marks)



i). How many complete revolutions will the wheel make in travelling 1km?

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ii*)* A cyclist travels 28 km in 1 hour 45 minutes, find her average speed in km/hr.

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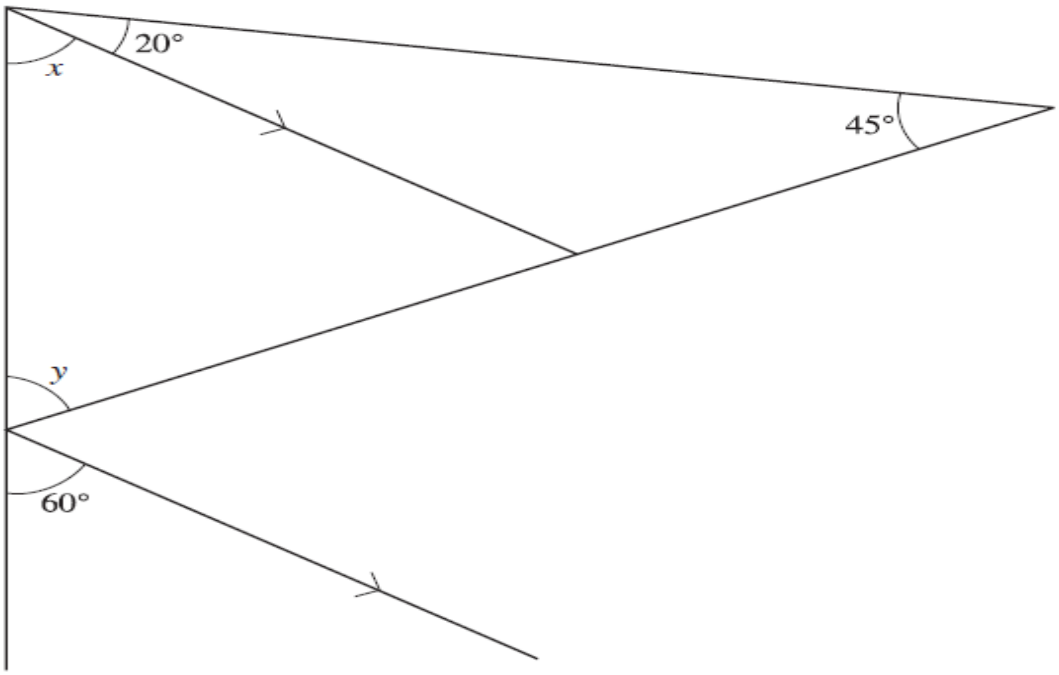
..... (2marks).

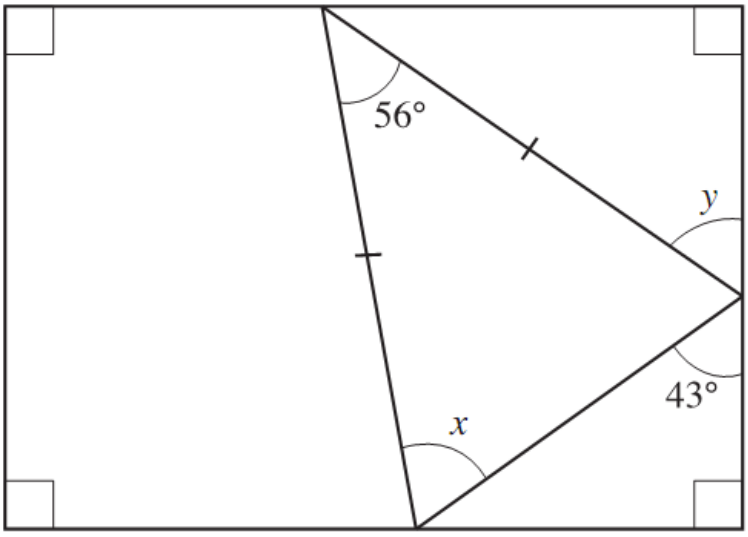
QUESTION 2 (9 Marks)

(a) Find the size of **each** of the angles marked *x* and *y* in the following diagram.



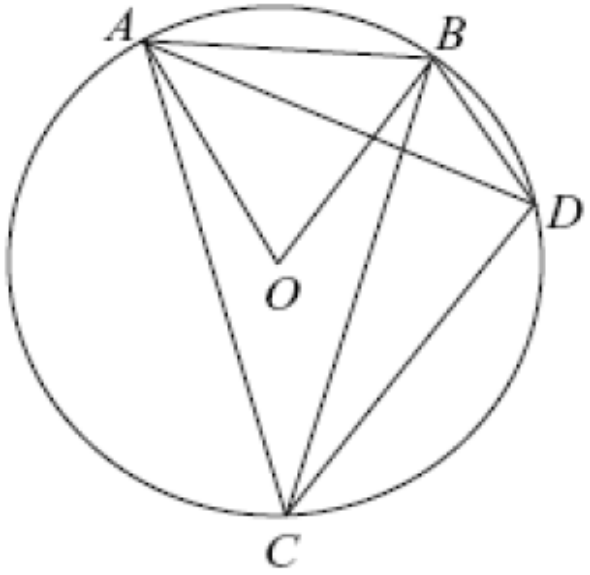
Angle X = ... Angle y = ... (2marks).

b) In the figure below, find angle x and y



Angle x=..... Angle y =..... (2marks)

c). Given that O is the centre of the circle and that $\angle AOB=75^{o}$, $\angle CBD=62^{o}$, $\angle BAD=30^{o}$, calculate



i) Angle ACB =

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ii) Angle BDA =

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iii) Angle ABD =

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..... (3marks)

d). i) Solve the following equation $3x + 2 = 2(3 - 2x)$ (2marks)

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QUESTION 3. (7 Marks)

a). This table shows the height of children at a school:

Height (h cm)	Frequency (f)		
130 < h ≤ 140	40		
140 < h ≤ 150	60		
150 < h ≤ 160	180		
160 < h ≤ 170	200		
170 < h ≤ 180	90		
180 < h ≤ 190	30		

(a) How many children are there in the school?

…… (1 mark)

(b) What is the modal class?

…… (1 mark)

(c) Which class contains the median?

…… (1 mark)

(d) Calculate an estimate of the mean height of the children in the school.

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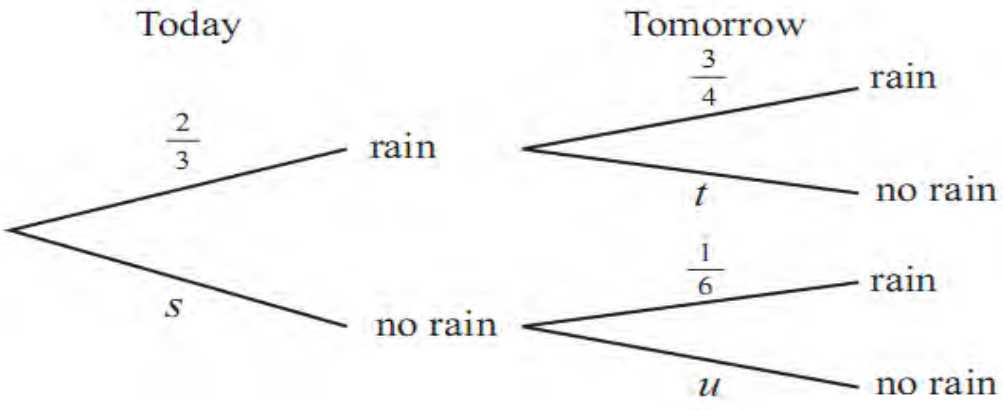
QUESTION 4. (7 Marks)

a) The probability that it rains today is $\frac{2}{3}$. If it rains today, the probability that it will rain tomorrow is $\frac{3}{4}$. If it does **not** rain today, the probability that it will rain tomorrow is $\frac{1}{6}$. The tree diagram below shows this information.



i) Write down, as fractions, the values of s, t, and u.

s = …….

t = ……

u = …….. (3 marks)

ii) Calculate the probability that it rains on both days.

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…… (2 marks)

iii) Calculate the probability that it will **not** rain tomorrow.

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…… (2 marks)

QUESTION 5. (7 Marks)

a) A formula used to calculate the flow of water in a pipe is $f = \frac{kd^2}{20}$

Change the subject of the formula to d. (2 marks)

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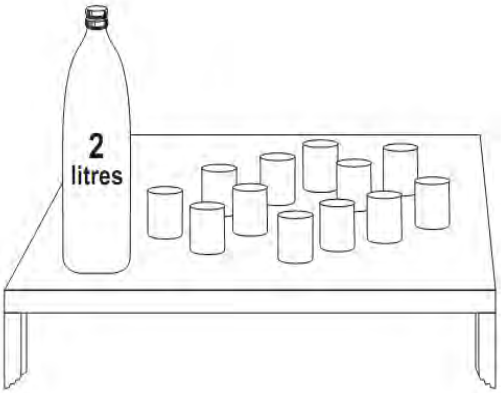
b). Lemonade is to be poured from a 2 litre bottle into glasses. Each glass is in the shape of a cylinder of radius 3 centimetres and height 8 centimetres. How many full glasses can be poured from the bottle? (3 marks)



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c) Solve $\log_5 (3x + 1) = 2$. (2 marks)

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QUESTION 6 (8 Marks)

a) Solve algebraically for X: $27^x = 9^{x+2}$ (2 marks)

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b) Solve the quadratic $2x^2 - 11x + 12 = 0$ (2marks)

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(c) Solve $3 - 5x \leq 2$. (2marks)

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d) Solve the following pair of simultaneous equations: (2marks)

$x + 3y = 10$

$7x - 2y = 1$

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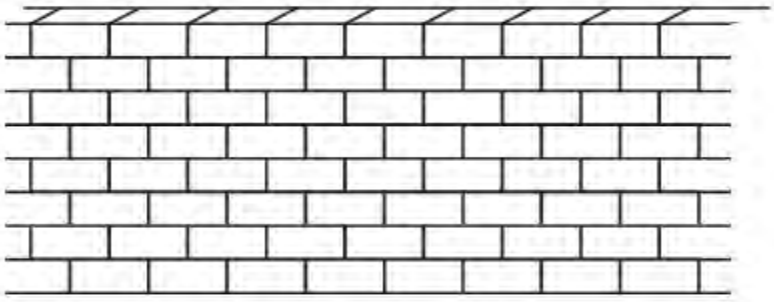
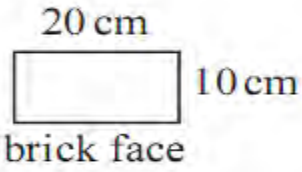
QUESTION 7 (7 marks)



Part of the wall



(a) A builder estimates the number of bricks in a wall by dividing the area of the wall by the area of the face of a brick. A brick wall is 10 metres long and 1.5 metres high. Each brick is 20 centimetres long and 10 centimetres high. Calculate how many bricks the builder estimates are in the wall.

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……(3marks)

(b) Another wall will need 720 bricks. The builder adds an extra 5% to this number to allow for mistakes.

i).Calculate how many bricks the builder needs to buy.

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……(2marks)

ii) Bricks are sold in packs of 100 which cannot be split. How many packs should the builder buy? ……

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…… (2marks)

QUESTION 8 (8 Marks)

a) Prove that $\tan^2 x + 1 \equiv \frac{1}{\cos^2 x}$ (3 marks)

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b) i) Find $\int (4x - 5)dx.$ (2marks)

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ii) The gradient of a curve is given by $\frac{dy}{dx} = 4x - 5$. The curve passes through the point (3,7). Find the equation of the curve.

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QUESTION 9 (6 Marks)

The distance s meters described by a car in time t seconds is given by: $s = 4t^3 - t^2 + 7t - 1$.

a) Determine the equation for velocity

b) Fine the velocity when t = 1.5 s.

c). Determine the equation for acceleration

d) Find the acceleration when t = 0.

a) Equation for velocity (2 marks)

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b) Velocity when t= 1.5 secs. (1mark)

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c). Equation for acceleration (2 marks)

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d) Acceleration when t= 0 secs (1 mark)

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QUESTION 10. (7 Marks)

a) The price of a laptop is reduced from £400 to £320. Calculate the percentage reduction in the price of the laptop.

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.....(2marks)

b) Layla buys a new stereo using the monthly payment plan. The cash price of the stereo is £360. The total cost of the monthly payment plan is **5% more than the cash price**. Layla pays a deposit of one fifth of the cash price followed by 30 equal monthly payments. How much will Layla pay each month?

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c) Maria, Carolina and Pedro receive $800 from their grandmother in the ratio Maria: Carolina: Pedro = 7:5:4. Calculate how much Carolina and Pedro receive.

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.....(2 marks)

QUESTION 11 (6 Marks)

If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ *and* $B = \begin{pmatrix} 5 & 3 \\ 2 & 1 \end{pmatrix}$ then

a) Find A + B (2 marks)

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b) Find AB (2 marks)

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c) Find (A^{-1}), the inverse of A (2 marks)

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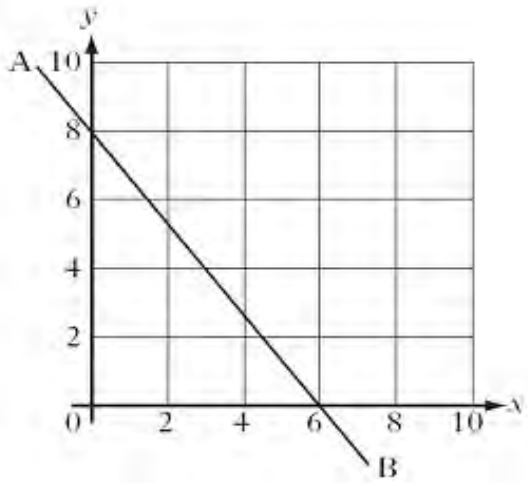
QUESTION 12 (6 marks)

a) Find the equation of the straight line AB shown in the diagram. (3 marks)



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b) Given that $U = \begin{pmatrix} 2 \\ 0 \\ 1 \end{pmatrix}$ and $V = \begin{pmatrix} -1 \\ 2 \\ 4 \end{pmatrix}$, find **3U - 2V** (3 marks)

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END