1. (a) Find the value for each of the following:

(i) $\left(\frac{25}{36}\right)^{\frac{1}{2}}$ (ii) $64^{\frac{2}{3}}$ (iii) 7^{-3}

(6 marks)

(b) Simplify the following expressions.

(i) $4x^{\frac{1}{3}}y^{-4} \times 7x^{1\frac{2}{3}}y^{6}$ (ii) $15a^{4} \div 3a^{-2}$

(5 marks)

(iii) $\sqrt[4]{16x^{8}y^{4}}$

(3 marks)

(c) Simplify the expression and write your answer with positive indices.

$3(x^{-3}y^{4})^{-2}$

(3 marks)

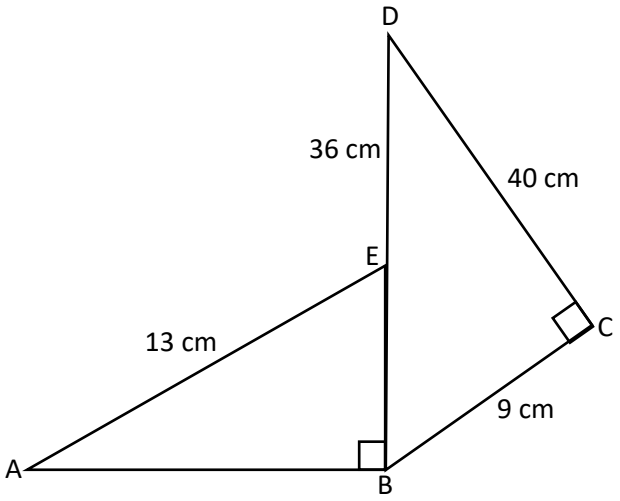
(d) Solve each of the following equations.

(i) $9^x = 27$ (ii) $5^{2x} \times 125 = \frac{1}{5^{3x}}$

(7 marks)

Total of 24 marks

2. The diagram below, **not drawn to scale**, shows BC = 9 cm, CD = 40 cm, DE = 36 cm and AE = 13 cm.



(a) Using the diagram above, find

(i) the length of BD.

(3 marks)

(ii) the length of AB.

(4 marks)

(b) To support a tree, a rope is attached to its trunk at 10 feet above the ground and pulled tightly. The other end of the rope is attached to a stake in the ground which is 9.6 feet away from the base of the trunk.

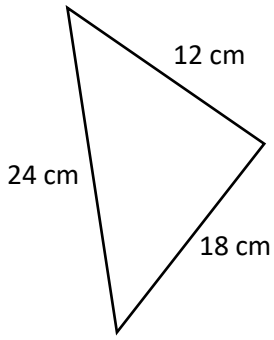
(i) Draw a well-labelled diagram to show the above information.

(2 marks)

(ii) Calculate the length of the rope. Write your answer correct to **THREE** significant figures.

(3 marks)

(c) Use calculations to determine whether the given triangle is a right angle.



(3 marks)

Total of 15 marks

3. (a) Simplify

$$\frac{2x+3}{4} - \frac{x-5}{3}$$

(4 marks)

(b) Solve the equation for x

$$\frac{1-3x}{5} + \frac{2x-2}{4} = -1$$

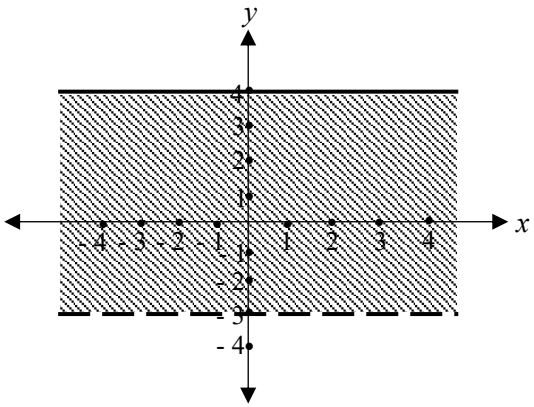
(5 marks)

(c)

(i) Solve the inequality $-8x > 48$

(2 marks)

(ii)



(2 marks)

Write down an inequality which represents the shaded region on the graph.

(d) A car rental company offers two payments options. You can pay \$25 a day plus \$0.15 a mile (option A) or you can pay \$10 a day plus \$0.40 a mile (option B). Let x represent the number of miles.

(i) Write an algebraic expression, in x, to represent option A.

(1 mark)

(ii) Write an algebraic expression, in x, to represent option B.

(1 mark)

(iii) Assuming that option A is cheaper than option B, write an inequality to represent this.

(2 marks)

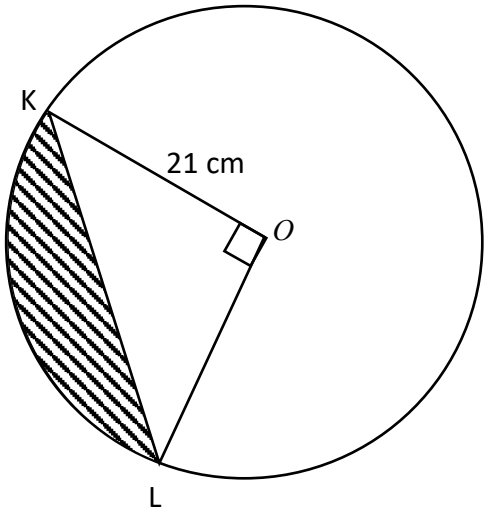
(iv) Solve the inequality and determine what number of daily miles will option A be the cheaper plan?

(3 marks)

Total of 20 marks

4.

(a)



Use π = $\frac{22}{7}$

In the diagram above**, not drawn to scale**, shows a circle with centre *O* and a radius of 21 cm.

(i) Calculate the area of the minor sector K*O*L.

(3 marks)

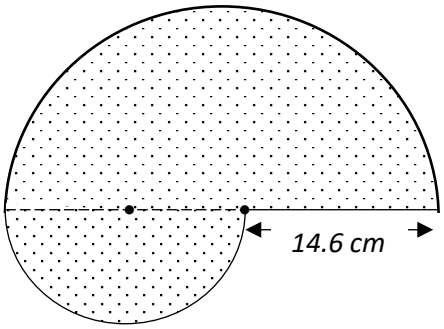
(ii) Calculate the area of the triangle K*O*L.

(3 marks)

(iii) Calculate the area of the shaded region.

(1 mark)

(b)



Use π = 3.14

In the diagram above, **not drawn to scale**, shows two semi-circles. The radius of the larger semi-circle is the diameter of the smaller.

(i) Calculate the area of the shape correct to two decimal places.

(5 marks)

(ii) Use calculations to show that the perimeter of the shape correct to one decimal place is 83.4 cm.

(5 marks)

Total of 17 marks

5. The diagram shows the graph of the straight lines $y = 3x + 2$ and $y = \frac{1}{2}x - 3$.

(a) Determine the solution for the pair of simultaneous equations $y = 3x + 2$ and $y = \frac{1}{2}x - 3$.

(1 mark)

(b) Complete the table of values for the equation $y = -2x + 7$

x	- 1	0	3	6
y				

(2 marks)

(iii) Draw the graph of $y = -2x + 7$ on the same graph paper.

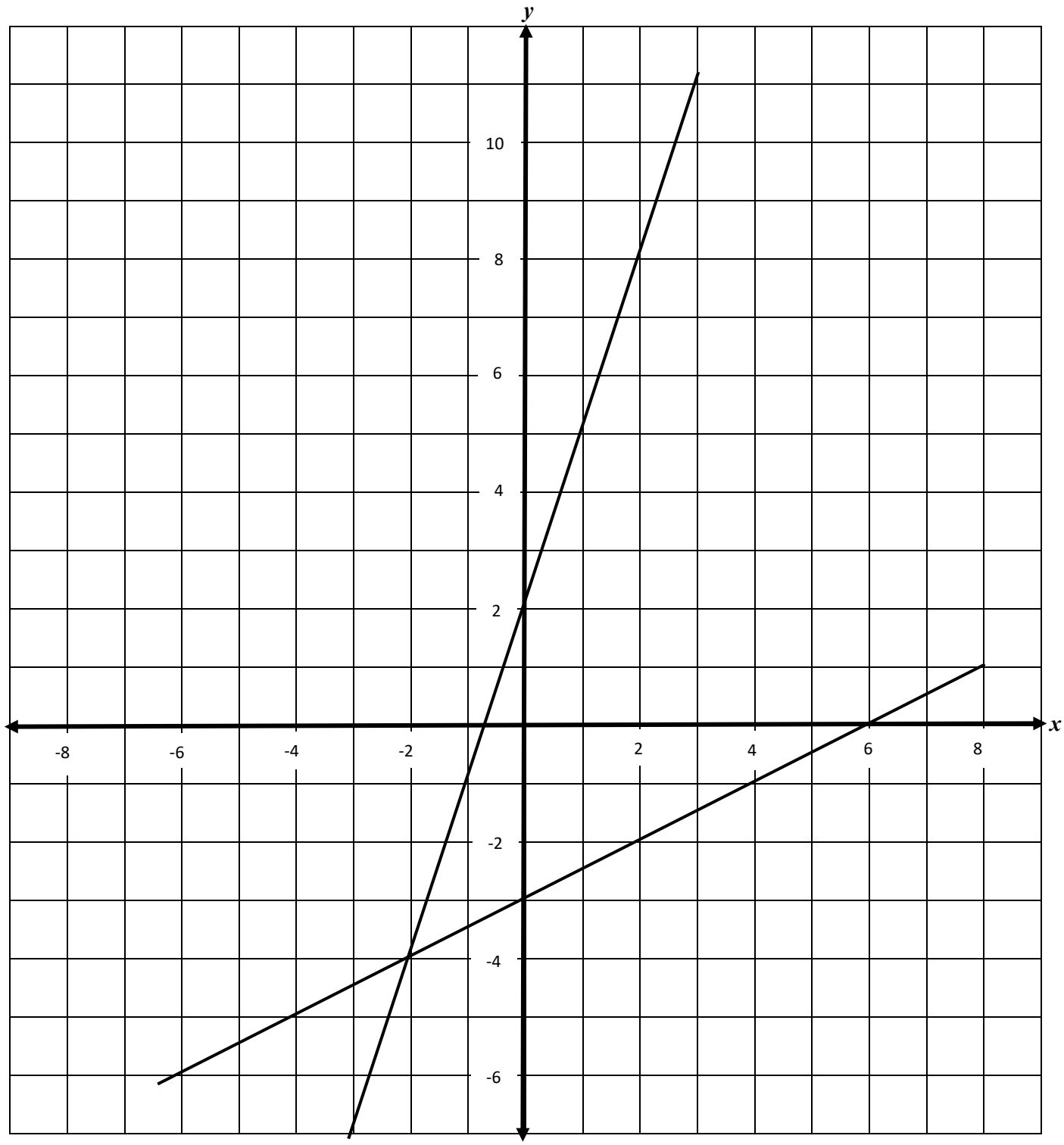
(2 marks)

(iv) From your graph, determine the solution for the pair of simultaneous equations $y = -2x + 7$ and $y = 3x + 2$

(1 mark)

(v) On your graph, determine the point of intersection for $y = -2x + 7$ and $y = \frac{1}{2}x - 3$.

(1 mark)


y
x
10
8
6
4
2
-2
-4
-6
-8
-6
-4
-2
2
4
6
8

6. A florist makes bouquets of flowers, each consisting of x roses and y orchids. For each bouquet she applies the following constraints:

   - the number of orchids must be at least half the number of roses
   - there must be at least two roses
   - there must be no more than 12 flowers

   (a) Write THREE inequalities for the constraints given.

   (3 marks)

   (b) **On the answer sheet provided**, graph the inequalities and find the common area.

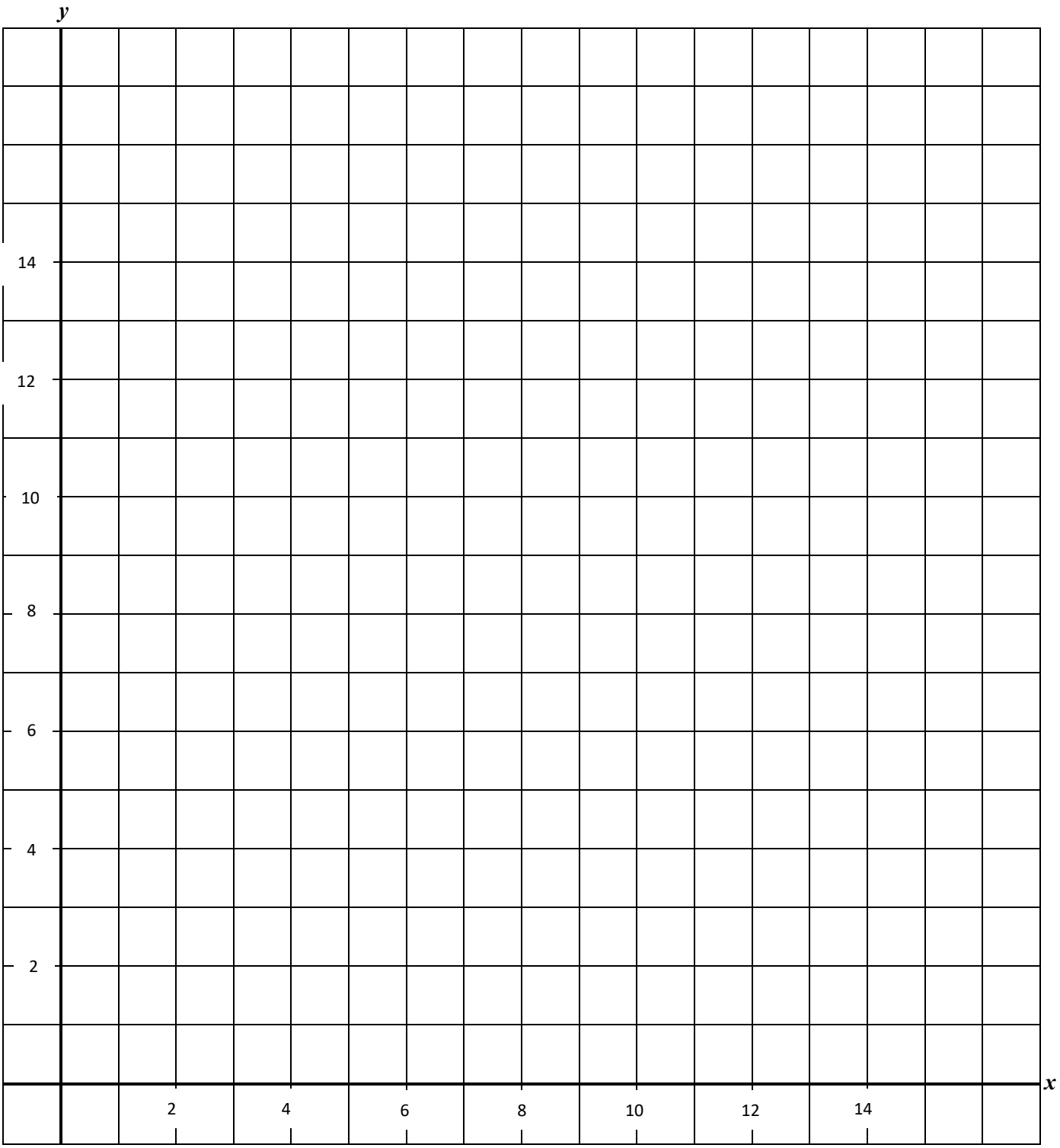
   (3 marks)

   (c) State the coordinates of the points which represent the vertices of the common region.

   (1 mark)

   (d) The florist sells a bouquet of flowers to make a profit of $3 on each rose and $4 on each orchid. Determine the MAXIMUM possible profit on the sale of each bouquet.

   (3 marks)



Total of 17 marks

END OF EXAM

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THE TEST.