# Secondary 4 Mathematics 2nd Term Pre-exam

Time allowed: 1 hour 20 minutes

Total Mark: 66

*Instructions:*

1. *This paper consists of 3 sections, A(1), A(2) and B. Each section carries 22 marks.*
2. *Attempt ALL questions. Write your answers in the spaces provided in this Question/Answer paper.*
3. *Unless otherwise specified, all workings must be clearly shown.*
4. *Unless otherwise specified, numerical answers must either be exact or correct to 3 significant figures.*
5. *The diagrams in this paper are not necessarily drawn to scale.*

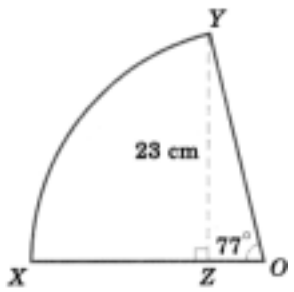
**SECTION A(1) (22 marks)**

1. Solve the equation $4\cos 3\theta = 1$ where $0° < \theta < 30°$.

(3 marks)

2. Find the perimeter of the sector OXY as shown.

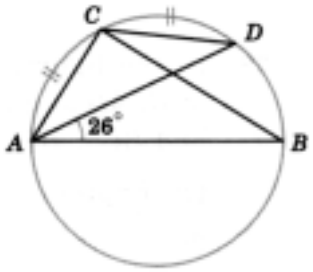
(3 marks)



3. The 12th term of an arithmetic sequence is twice the 3rd term. The sum of first 3 terms is 24. Find the first term of the arithmetic sequence.

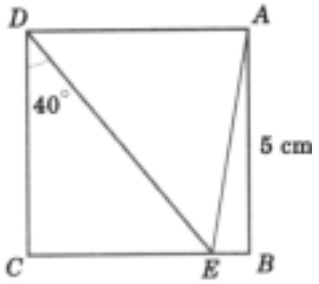
(4 marks)

4. In the figure, AB is a diameter of the circle. If $\overset{\frown}{CA} = \overset{\frown}{CD}$ and $\angle DAB = 26°$, find $\angle ADC$.




(4 marks)

5. In the figure, ABCD is a square of side 5 cm and $\angle EDC = 40°$. Find the length of AE correct to 3 significant figures.



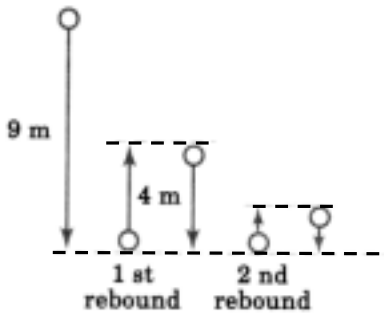

(4 marks)

6. Solve the quadratic inequality $x(x-1) \leq x(2x+1)$ and represent the solution on the number line.

(4 marks)

**SECTION A(2) (22 marks)**

7. A ball falls from a height of 9 m and rebounds to a height of 4 m. The ball continues to fall and rebound such that each time the height of the rebound is $\frac{4}{9}$ of the height from which it previously fell.



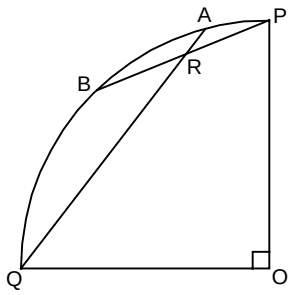

(a) How high does the ball reach after the fifth rebound?

(3 marks)

(b) What is the total distance travelled by the ball before it comes to rest?

(3 marks)

8. In the figure, OPABQ is a quadrant of a circle. $\overset{\frown}{PA} : \overset{\frown}{AB} : \overset{\frown}{BQ} = 1 : 2 : 3$ and BP intersects AQ at R.



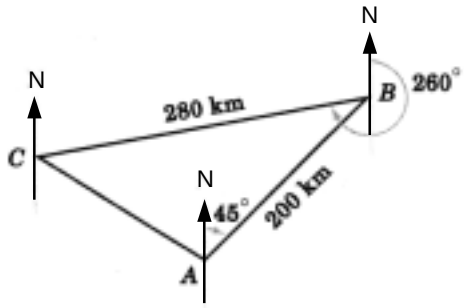

(a) Find ∠AOP, ∠AOB and ∠BOQ.

(4 marks)

(b) Find ∠BPQ and ∠AQP.

(4 marks)

9. In the figure, a ship sails 200 km from point A on a true bearing $045°$ to point B. From B, it sails 280 km on a true bearing $260°$ to point C.




(a) Find $\angle CBA$ .

(2 marks)

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(b) Find the distance AC, correct to the nearest km,

(2 marks)

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(c) Find the true bearing of A from C, correct to the nearest degree.

(4 marks)

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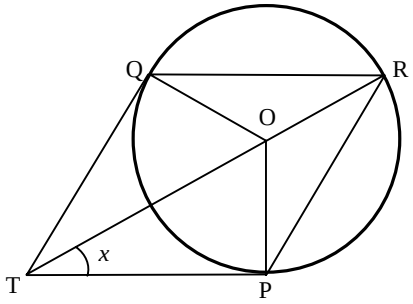
**SECTION B (22 marks)**

10. In the figure, TP and TQ are tangents drawn from the point T to a circle with centre O and radius 1 unit. TO is produced to cut the circle at R.




(a) Given that $\angle PTO = x$, write down expressions, in terms of $x$, for

(i) $\angle TOP$;

(ii) $\angle QOP$;

(iii) $\angle QRP$.

(6 marks)

10. (b) Given that TPRQ is a parallelogram.

(i) Find the value of $x$.

(ii) Find the length of TR.

(5 marks)

11. An association plans to build a hostel with $x$ single rooms and $y$ double rooms satisfying the following conditions

(I) The hostel will accommodate at least 48 persons.

(II) Each single room will occupy an area of 10 $m^2$, each double room will occupy an area of 15 $m^2$ and the total available floor area for the rooms is 450 $m^2$.

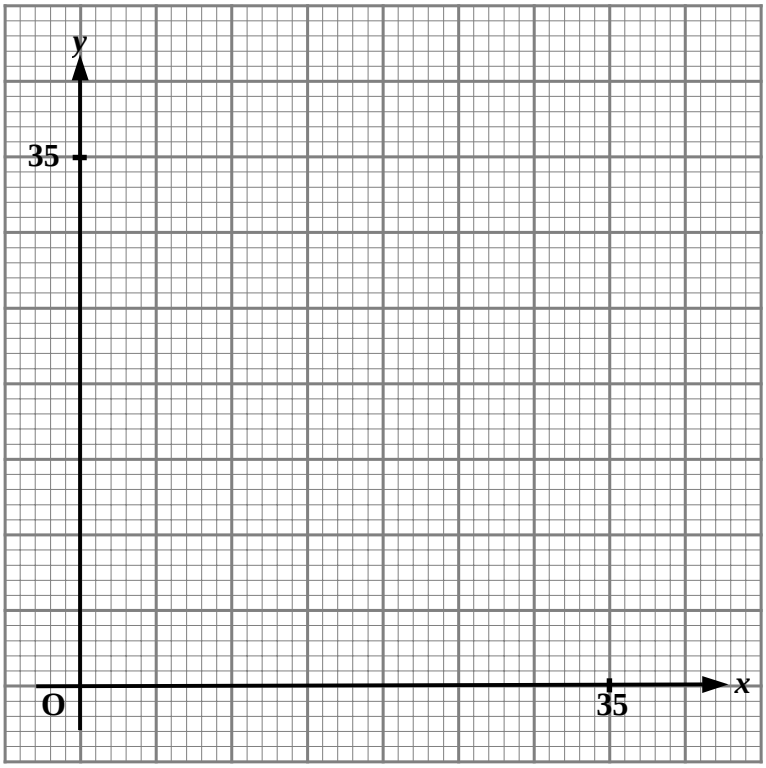
(III) The number of double rooms should not exceed the number of single rooms.

(a) (i) Write down the inequalities in $x$ and $y$ to represent the above constraints.

(ii) Hence, draw and shade the region that satisfies the inequalities.

(7 marks)

11. (a) (ii)




(b) If the profits on a single room and a double room are \$3000 and \$4000 per month respectively, find the values of $x$ and $y$ so that the total profit will be a maximum.

(4 marks)

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**END OF PAPER**