



Name: _____

Teacher: _____

Class: _____

FORT STREET HIGH SCHOOL

2011

**PRELIMINARY SCHOOL CERTIFICATE COURSE
ASSESSMENT TASK 2**

Mathematics Extension I

TIME ALLOWED: 90 MINUTES

Outcomes Assessed	Questions	Marks
Applies appropriate techniques to solve problems in co-ordinate geometry.	1	
Applies appropriate techniques to solve problems in circle geometry.	2	
Manipulates algebraic expressions to solve problems from topic area polynomials	3	
Chooses and applies appropriate algebraic techniques to solve problems involving quadratic functions and locus	4	

Question	1	2	3	4	Total	%
Marks	/18	/15	/15	/12	/60	

Directions to candidates:

- Attempt all questions
- The marks allocated for each question are indicated
- All necessary working should be shown in every question. Marks may be deducted for careless or badly arranged work.
- Board – approved calculators may be used
- Each new question is to be started in a new booklet
- Write in blue or black pen only

Question 1 (18 Marks)

Start a new page

Marks

- a) Using the K Method , find the equation of the line which passes through the point of Intersection of $y = 6x - 3$ and $2x + 4y = 7$ and

Parallel to the line $5x - 2y = 9$

5

- b) Find the coordinates of the point that divides externally the interval Joining the points $A(2,-3)$ and $B(5,6)$ in the ratio $3 : 2$

3

- c) Find the equation of the line with gradient $\frac{2}{b}$, which passes through The point $(3b, 2b)$. Give your answer in general form.

2

- d) (i) Find the perpendicular distance from $(2,1)$ to the line $3x + 5y = 1$ In exact form.

2

- (ii) Find the length of the chord cut off from the line $3x + 5y = 1$ by the circle $(x - 2)^2 + (y - 1)^2 = 16$. Correct to 2 decimal places

2

- e) Show that the point $P(5,9)$ lies on the interval joining $A(-1,-3)$ to $B(7,13)$ and find the ratio in which it divides the interval AB .

4

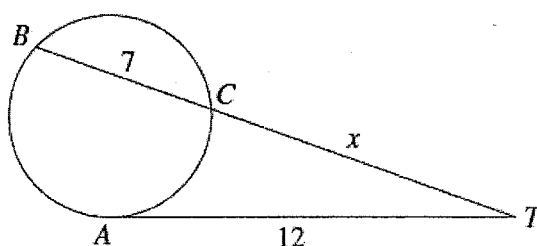
Question 2 (15 Marks)

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Marks

- a)

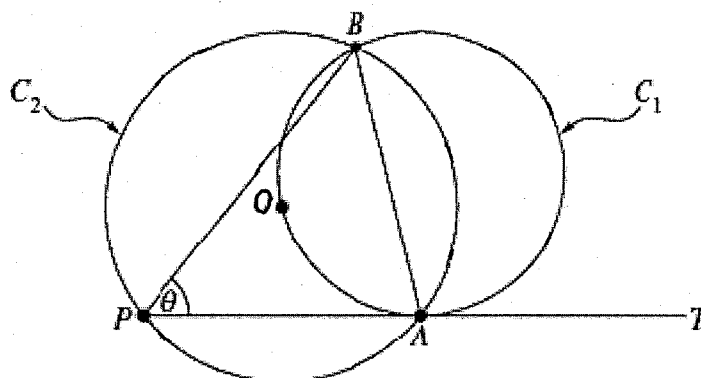
2



The line AT is the tangent to the circle at A , and BT is a secant meeting the circle at B and C .

Given that $AT = 12$, $BC = 7$ and $CT = x$, find the value of x .

b)

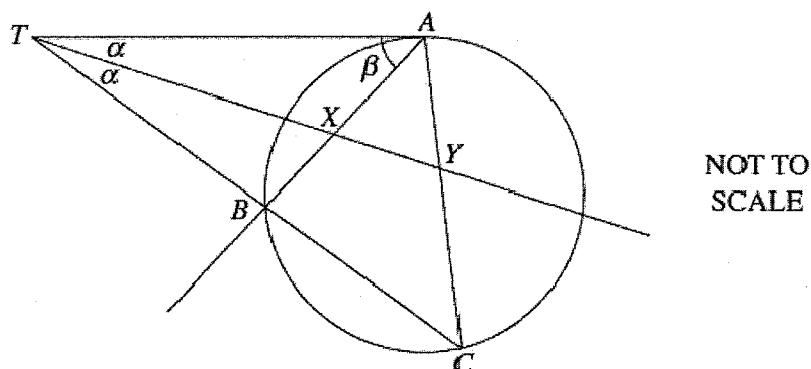


Two circles, C_1 and C_2 , intersect at points A and B . Circle C_1 passes through the centre O of circle C_2 . The point P lies on circle C_2 so that the line PAT is tangent to circle C_1 at point A . Let $\angle APB = \theta$.

Copy or trace the diagram into your writing booklet.

- | | |
|---|---|
| (i) Find $\angle AOB$ in terms of θ . Give a reason for your answer. | 1 |
| (ii) Explain why $\angle TAB = 2\theta$. | 1 |
| (iii) Deduce that $PA = BA$. | 2 |

c)



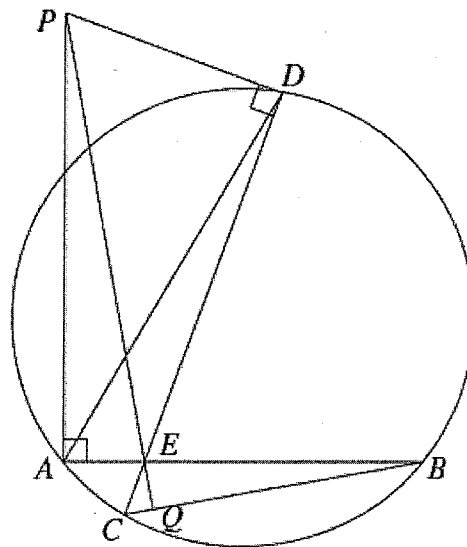
In the diagram the points A , B and C lie on the circle and CB produced meets the tangent from A at the point T . The bisector of the angle ATC intersects AB and AC at X and Y respectively. Let $\angle TAB = \beta$.

Copy or trace the diagram into your writing booklet.

- | | |
|--|---|
| (i) Explain why $\angle ACB = \beta$. | 1 |
| (ii) Hence prove that triangle AXY is isosceles. | 2 |

d)

Two chords of a circle, AB and CD , intersect at E . The perpendiculars to AB at A and CD at D intersect at P . The line PE meets BC at Q , as shown in the diagram.



- | | |
|---|---|
| (i) Explain why $DPAE$ is a cyclic quadrilateral. | 1 |
| (ii) Prove that $\angle APE = \angle ABC$. | 2 |
| (iii) Deduce that PQ is perpendicular to BC . | 3 |

Question 3 (15 Marks)

Start a new page

Marks

- a) Consider the equation $x^3 + 6x^2 - x - 30 = 0$
One root of this equation is equal to the sum of the other two roots.
Find the values of the three roots. 3
- b) Divide $P(x) = 2x^4 - 7x^2 - 5x + 4$ by
 $D(x) = 2x^2 - 3x - 2$. State the remainder 3
- c) The polynomial $p(x) = ax^3 + 16x^2 + cx - 120$, a and c are constants
The three zeros of $p(x)$ are $-2, 3$ and β . Find the value of β . 3
- d) Completely factor $P(x) = x^4 - x^3 + x^2 - 3x - 6$ and hence solve
 $P(x) = 0$ 4
- e) Sketch the polynomial $P(x) = x(x - 2)^2(x + 3)(x - 5)^3$ 2

Question 4 (12 Marks)

Start a new page

Marks

- a) Find the locus of a point $P(x,y)$ which moves so that it is three times as far from point A (-2 , 7) than it is from the point B (4 , -5). Describe the locus geometrically stating key features 4
- b) Find the vertex, focus and directrix of the parabola
 $3y^2 - 12y - 8x = 15$. Then draw a neat sketch labelling the vertex, focus and directrix. 4
- c) For what value of m is the line $y = mx - 3$ a tangent to the circle
 $(x - 4)^2 + (y - 3)^2 = 16$ 4

The End