DAPTO HIGH SCHOOL

EXTENSION 1

YEAR 11

HALF-YEARLY EXAMINATION

2009

General Instructions

- Reading time – 5 minutes
- Working time – 1 ½ hours
- Write using blue or black pen
- Approved calculators may be used
- Write on only one side of the paper
- Each question must be written on a new sheet of paper
- Write your name at the top of each piece of paper

Total Marks – 72

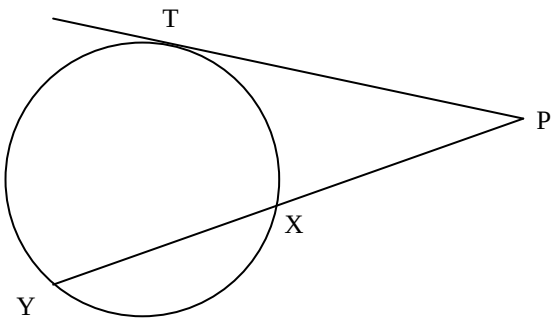
- Attempt Questions 1 – 6
- All questions are of equal value

Question 1 (12 Marks) **Marks**

(a) Solve $\frac{4}{x+2} \geq 3$ **1**

(b) Write down the domain and range for: $y = -\sqrt{49 - x^2}$ **2**

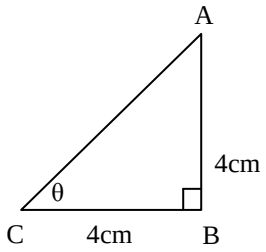
(c)



XY = 25cm and XP = 15cm. Find the length of TP, stating a reason for your answer.

Give your answer in simplest surd form. **2**

(d)



Consider the triangle ABC.

(i) Show that $AC = 4\sqrt{2}$ **1**

(ii) Hence, find the exact value of $\sec\theta$. **1**

(e) Find the exact value of $\sin 120° - \tan 210°$.
Express your answer with a rational denominator. **3**

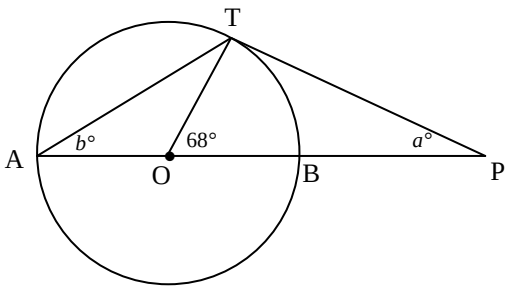
Question 2 (12 Marks) **Marks**

(a) Simplify: $\dfrac{50-2x^2}{15-3x} \times \dfrac{x^2+5x}{x^2+10x+25}$ **3**

(b) Find x given that $\sin(x+25)° = \cos 55°$ **1**

(c) If $f(x) = 3kx$ and $f(-2) = 7$, find the value of k. **2**

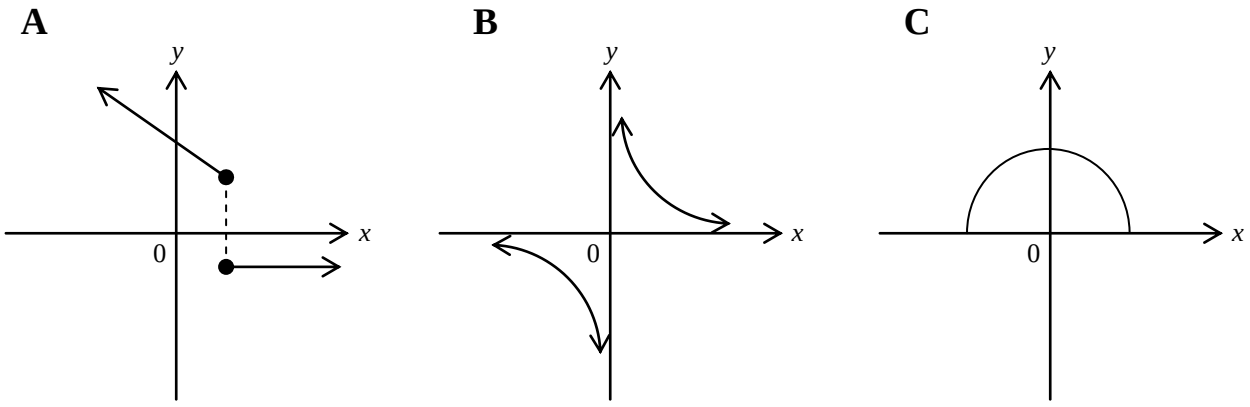
(d)



PT is a tangent to the circle with centre O. AB is a diameter.

Find the values of a and b. Give reasons for your answers. **4**

(e)



(i) Which of the figures (A, B or C) represent functions? **1**

(ii) Which of the graphs (A, B or C) are continuous? **1**

Question 3 (12 Marks) **Marks**

(a) Sketch the following functions, showing all necessary features:

(i) $y = 3^{-x}$ **2**

(ii) $y = \frac{-2}{x+2}$ **2**

(iii) $y = |2x + 1|$ **2**

(b) A is 8 kilometres due north of B and 16 kilometres due west of C.

(i) Show this information on a diagram. **1**

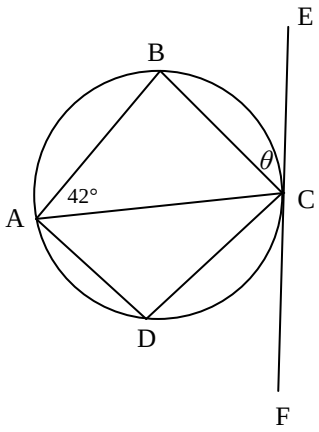
(ii) Find the bearing of B from C. **2**

(c) Solve the equation $(x + 2)^2 + (x - 1)(x - 7) = 12$ by first expanding and simplifying.

Give your answer in simplest surd form. **3**

Question 4 (12 Marks) **Marks**

(a) *ABCD* is a cyclic quadrilateral where *AC* bisects $\angle DAB$, $\angle BAC = 42°$ and *FE* is a tangent to the circle at *C*.



(i) Find the size of θ ($\angle BCE$). You must give a reason. **1**

(ii) Prove that *FE* is parallel to *DB*. **3**

(b) Find:

(i) $\lim\limits_{x \to 3} \dfrac{x^2 - 9}{4x - 12}$ **2**

(ii) $\lim\limits_{x \to \infty} \dfrac{3x^2 + 2x}{5 - x^2}$ **2**

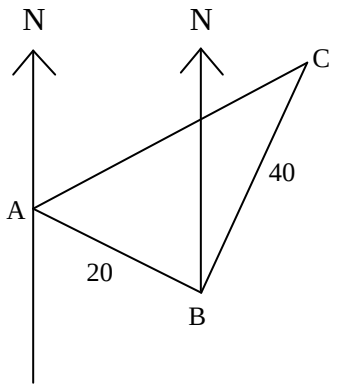
(c) Find the size of each angle of a regular octagon. **2**

(d) Solve $|x + 2| + |x - 2| = 4$. **2**

Question 5 (12 Marks) **Marks**

(a) On a number plane, sketch the region which satisfies the inequalities $y \leq 2x - x^2$ and $y > 2x - 1$. **3**

(b)



Two geologists on a large flat mining claim drive 20km from a point A on a bearing of 150°T to point B. They then drive 40km on a bearing of 020°T to point C.

(i) Copy the above diagram onto your answer sheets and show that $\angle ABC = 50°$. **1**

(c) Solve the following simultaneous equations: **3**

$$a + b + c = 6$$
$$2a + 3b + c = 13$$
$$a + 2b - c = 5$$

(d) (i) Determine whether the function $f(x) = 4x - x^4$ is odd, even or neither. **2**

(ii) Describe the symmetry in the graph of the function $f(x) = 4x - x^4$. **1**

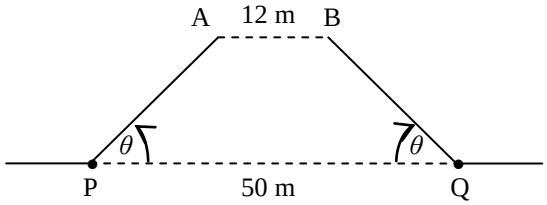
Question 6 (12 Marks) **Marks**

(a) (i) Show that the equation of the locus of the points $P(x, y)$ whose distance from the point $Q(11, -11)$ is twice the distance from the point $R(2, 1)$ is a circle given by $x^2 + 2x + y^2 - 10y = 74$. **2**

(b) Solve $3^{2n-4} = 81$. **2**

(c) Find the two values of θ, correct to the nearest minute, given that $\cos\theta = 0.507$ and $0° \leq \theta \leq 360°$. **3**

(d)



NOT TO SCALE

The figure shows the side view of bridge opened to let boats pass underneath.

When the equal arms of the bridge PA and QB are lowered, they meet exactly to form the straight roadway PQ, which is 50 metres long.

When the arms PA and QB are raised through an angle θ as shown, the 'corridor' AB is 12 metres wide.

Calculate the size of angle θ, correct to the nearest degree. **3**

End of Paper