SYDNEY BOYS HIGH SCHOOL
MOORE PARK, SURRY HILLS

Year 9

Yearly Examination 2011

Advanced Mathematics

General Instructions

- Working time – 90 minutes
- Write using black or blue pen.
- Approved calculators may be used.
- All necessary working MUST be shown in every question if full marks are to be awarded.
- Marks may not be awarded for untidy or badly arranged work.
- If more space is required, clearly write the number of the QUESTION on one of the back pages and answer it there. Indicate that you have done so.
- All answers must be given in exact simplified form unless otherwise indicated.
- Clearly indicate your class by placing an X, next to your class

Examiner: *B. Kilmore*

NAME:

Class	Teacher	
9 A	Mr Fuller	
9 B	Ms Chen	
9 C	Ms Nesbitt	
9 D	Mr Elliott	
9 E	Ms Ward	
9 F	Mr Boros	
9 G	Mr McQuillan	

Question	Mark
1	/15
2	/15
3	/13
4	/12
5	/14
6	/13
7	/15
Total	**/97**

Section 1 (15 Marks)

1. Round 0.070283 to 3 significant figures. **(1)**

2. If 100 is divided by $\frac{1}{5}$ and then, from, this the reciprocal of $3\frac{1}{3}$ is subtracted, what is the result? **(1)**

3. Solve $-4a \geq -18$ **(1)**

4. Use your calculator to find correct to 2 decimal places **(1)**
$$\frac{8+\sqrt{2}}{8-\sqrt{2}}$$

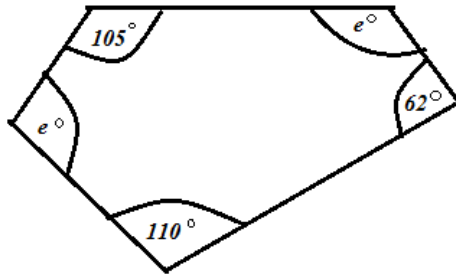5. Simplify: $4x - 3(x - 2)$ **(1)**

6. Expand and simplify: **(2)**

   a) $(1 - t)(8 - t)$
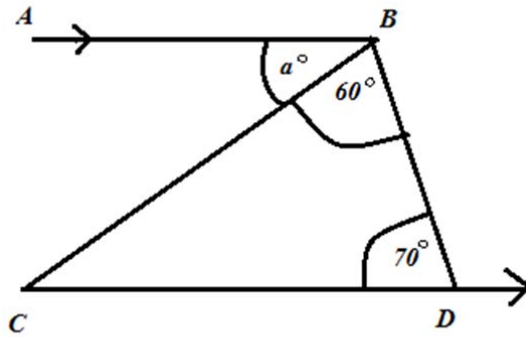
   b) $(a^2 + 1)^2$

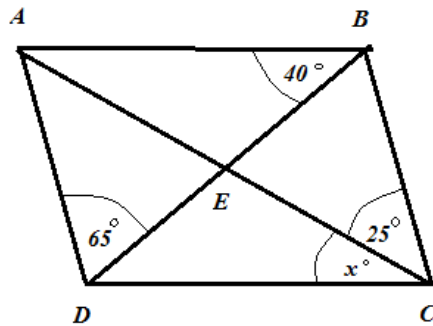7. Find the value of the pronumeral, giving reasons.   **(4)**

a)

b)

c)   ABCD is a parallelogram.

8. Between which 2 integers does the surd $\left(\sqrt{17} + 1\right)$ lie? **(1)**

9. Simplify: **(3)**

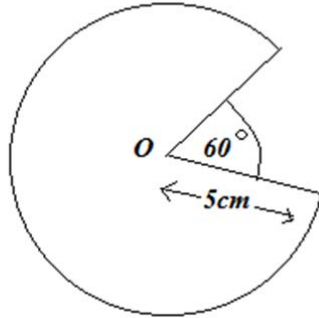   a) $\sqrt{10} \times \sqrt{5}$

   b) $\sqrt{24} - \sqrt{6}$

   c) $2\sqrt{3}(\sqrt{2} + \sqrt{3})$

Section 2 (15 Marks)

1. Find the perimeter correct to 1 decimal place: **(1)**

2. Find the area in cm^2 of a rhombus with diagonals measuring 8cm and 16cm. **(1)**

3. Solve the following equations: **(3)**

a) $\dfrac{3a}{7} + 3 = a$

b) $\dfrac{x}{4} - \dfrac{2x-1}{3} = \dfrac{x}{6} + 5$
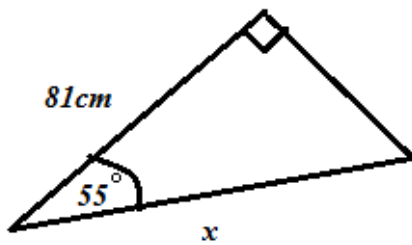
4. Make x the subject of the formula: (3)

   a) $a = 3(x - 2)$

   b) $y = \dfrac{x}{x+3}$

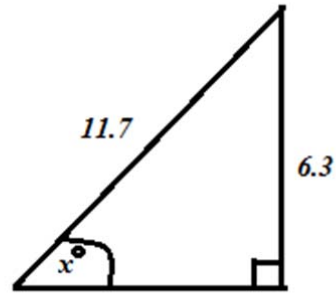5. Find the value of x in the following triangles:

   (2)

   a)

   81cm

   55°

   x

   Answer to 1 decimal place

b)

11.7   6.3

x°

Round to nearest minute.

6. If A = (3,6) and B = (-3,2),   **(5)**

   a) Find the midpoint of AB

   b) Find the length of AB. (Write your answer as a simplified surd)

   c) Find the equation of the line AB and express your answer in **general form.**

Section 3 (13 Marks)

1. Factorise: **(3)**

   a) $2m^2 - 242$

   b) $3r^2 - 15r + 2ry - 10y$

   c) $5x^2 + 13x - 6$

2. Find the gradient and y-intercept of the line $x - 2y + 7 = 0$. **(1)**

3. Graph the region $y \leq 2 + x$ **(1)**

4. When a decimal point is placed between 2 digits, the result is the average of the two digits. What are they? **(2)**

5. Simplify: **(4)**

a) $7x^6 \times 6x^7$

b) $6^{2+w} \div 6^w$

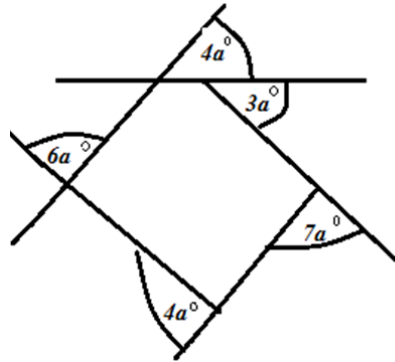c) $(\dfrac{m^4}{m^{-1}w^5})^{-5}$

6. Evaluate: $(-27)^{\frac{-2}{3}}$ **(2)**
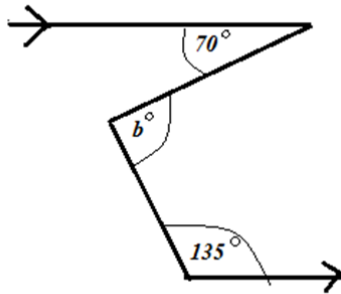
Section 4 (12 Marks)

1. Find the value of the pronumeral, giving reasons:
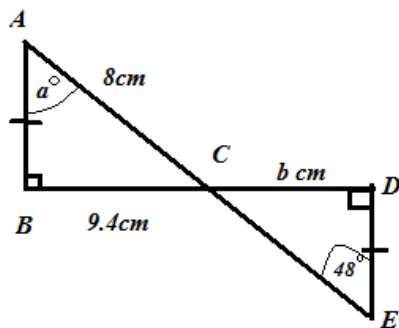
(3)

a)

b)

2. Prove that the 2 triangles are congruent and then find the value of the pronumerals:

(3)

3. What is the size of each of the angles in a regular octagon?   **(2)**

4. Two dice are rolled simultaneously. Find the probability that the first dice showed a five, given that the sum is a six.   **(1)**

5. Factorise: $x^2 + 2 + \frac{1}{x^2}$ **(1)**

6. Simplify: $\dfrac{5^{n+1} \times 5^{-2}}{5^{1-n}}$ **(2)**

Section 5 (14 Marks)

1. A card is selected at random from a standard pack of 52 cards. What is the
   probability of selecting an even numbered card which is black? **(1)**

2. The line whose equation is $y = x + 5$ is the perpendicular bisector of the line joining
   the points P(3,10) and Q (α , β). **(3)**

   a) Write down in terms of α and β, the co-ordinates of the mid-point of PQ.

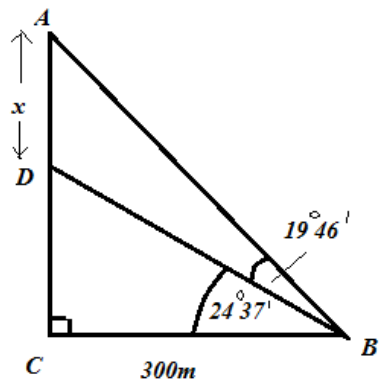   b) Show that $\beta = \alpha + 3$ and $\alpha + \beta = 13$.

3. A has twice as much money as B. If A has 10 cents more, one-fifth of A's amount
   would exceed one quarter of B's amount by 20 cents. How much do they each have?
   (2)

4. Find x and y given that

$$\frac{-12}{\sqrt{15}-3}=x-2\sqrt{y}$$

(3)

5. A ship leaves port and sails on a bearing of 305° for 200 km. How far is the ship west of the port at this point? Answer to the nearest km.

(2)

6. Find x correct to 1 decimal place.

(3)

Section 6 (13 Marks)

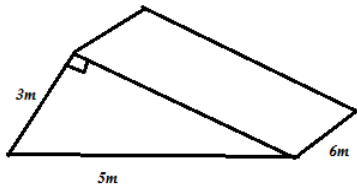**1.** Without evaluating each square, find the value of

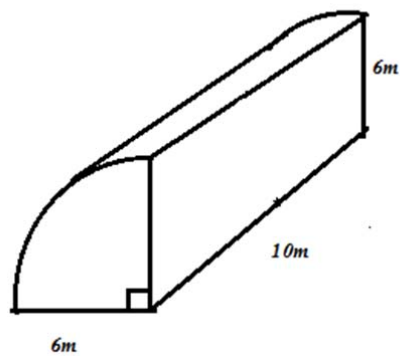$$30^2 - 29^2 + 28^2 - 27^2 + 26^2 - 25^2 + \cdots + 4^2 - 3^2 + 2^2 - 1^2$$

(3)

2. Find the surface area of these solids to the nearest whole unit:

(4)

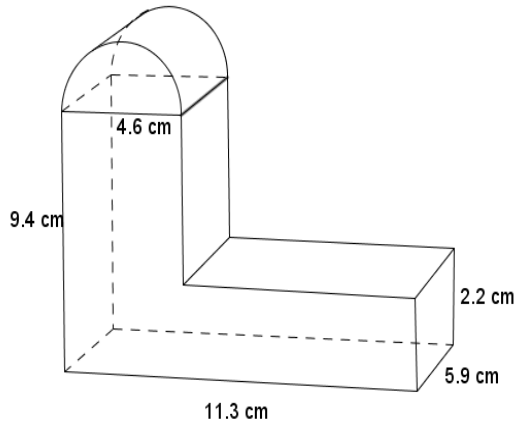**a)**

3m
5m
6m

b)

6m
10m
6m

3. Find the volume correct to 1 decimal place. **(3)**

4. Show that the radius of a semi-circle whose perimeter is numerically equal to its area is $\dfrac{2\pi + 4}{\pi}$. **(3)**

Section 7 (15 Marks)

1. Factorise **(4)**

    a) $\dfrac{a^3}{b^2c^3} - \dfrac{3a^2}{bc^2} + \dfrac{2a^3}{b^2c^2}$
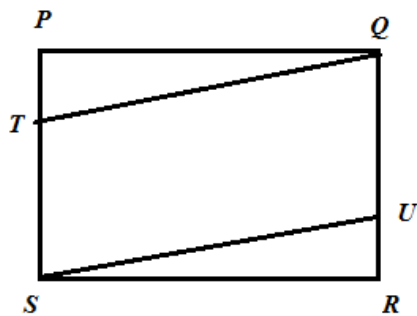
    b) $4(3x-5)^2 - 49(2x-3)^2$

2. Evaluate:
   $(2^x + 2^{-x})^2 - (2^x - 2^{-x})^2$ **(2)**

3. PQRS is a rectangle and PT=RU. Prove that TQUS is a parallelogram. **(2)**

4. In an exam, all questions were of equal value. Jack answered 7 of the first 12 questions correctly but only 40% of the remaining questions correctly. If he received a final mark of 50% for the whole test, How many questions were in the test?

    (3)

5. A plane which is 200 km out of Sydney is flying at a speed of 900 km/h when the pilot sights Sydney airport. Ten minutes later, Sydney airport is at an angle of depression of 28º and at this point the plane begins its descent.
    Assuming that its vertical rate of descent is a constant 30m/s, find how long it takes to make its descent. **(4)**