SYDNEY BOYS HIGH SCHOOL
MOORE PARK, SURRY HILLS

Year 9

Half Yearly Examination 2017

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.
- Clearly indicate your class by placing an X, next to your class

Examiner: *B.Kilmore*

NAME:

Class	Teacher	
9A	AYW	
9B	DY	
9C	AW	
9P	AF	
9L	TE/RE	
9U	JM	
9S	EC	

Question	Mark
1	**/16**
2	**/16**
3	**/16**
4	**/13**
5	**/13**
6	**/13**
7	**/13**
Total	**/100**

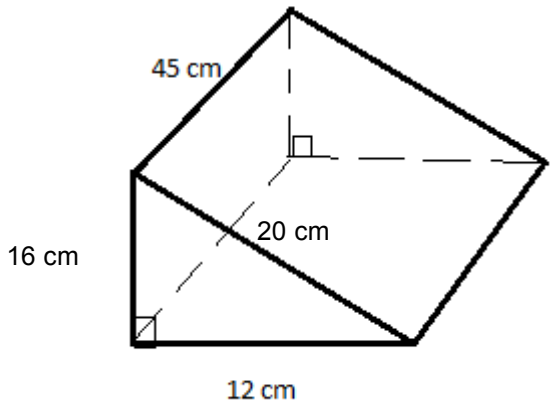
Section 1. (16 marks)

(a)	Simplify: (i) $7y-3y$ (ii) $\frac{3y}{5}+\frac{7y}{5}$ (iii) $4p^2\times 3p^4$	 **1** **1** **1**
(b)	Expand and simplify: (i) $(x+3)(x-6)$ (ii) $(x-5)^2$ (iii) $(x-7)(x+7)$	 **1** **1** **1**
(c)	Write 7.8056 correct to 3 significant figures.	**1**
(d)	Evaluate $49^{\frac{1}{2}}$	**1**

(e)	Simplify: (i) $\sqrt{75}$	**1**
	(ii) $2\sqrt{3}-4\sqrt{3}+3\sqrt{2}$	**1**
	(iii) $\sqrt{\frac{4}{25}}$	**1**
(f)	Write as a normal number: 1.686×10^{-5}	**1**
(g)	Find A such that $4\sqrt{2}=\sqrt{A}$	**1**
(h)	Find the ratio, in simplest form, of 75 cm to 2 m.	**1**
(i)	Express 375 000 in scientific notation	**1**
(j)	Increase \$50 by 6%	**1**

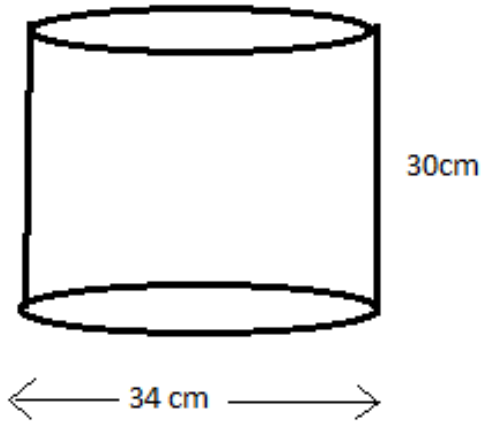
Section 2. (16 marks)

(a)	Simplify: $(2x)^0 - 2x^0$	**1**
(b)	Simplify: (i) $5x^2y^3 \times 4x^3y$ (ii) $(4x^3)^2$	**1** **1**
(c)	Simplify the folowing: (i) $\frac{5}{3x} + \frac{4}{3x}$ (ii) $\frac{x+2}{6} + \frac{x}{3}$ (iii) $3\sqrt{3} + \sqrt{48}$	**1** **2** **2**
(d)	Write with a rational denominator: $\frac{3}{\sqrt{5}}$	**1**

(e)	Convert (i) 2 500 GB to TB (ii) 2.7 kg to g	 **1** **1**
(f)	Find the surface area of the solid below  	**2**
(g)	Simplify: $\frac{4x}{3} \times \frac{9}{2x}$	**1**
(h)	Expand and simplify $(x-5)(2x+7)$	**2**

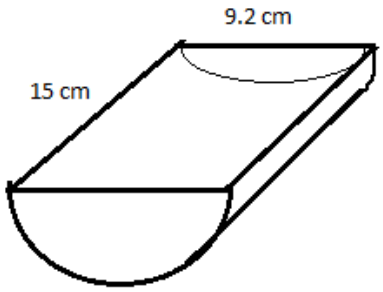
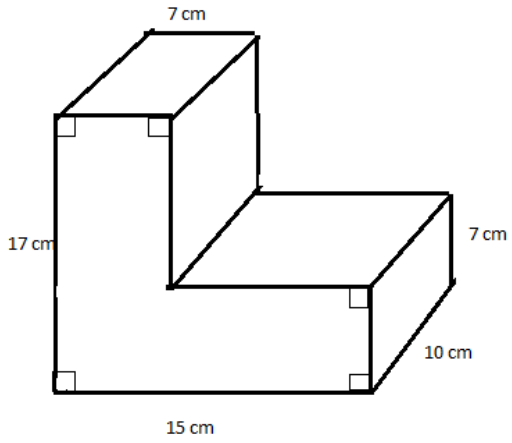
Section 3 (16 Marks)

(a)	Write $0.\dot{3}\dot{7}$ as a fraction in simplest form.	**1**
(b)	Expand and simplify $\sqrt{5}(\sqrt{20}-3)$	**2**
(c)	Which of the following is TRUE? A. $\pi = \frac{22}{7}$ B. $\sqrt{4} = \pm 2$ C. $\sqrt{5}$ is an irrational number D. All rational numbers are positive	**1**
(d)	Express $2+\frac{2x-1}{2}$ as a single fraction in simplest form.	**2**
(c)	The volume of a liquid in a bottle was measured as 1.25 L. (i) What is the absolute error for this measurement? (ii) Calculate the percentage error for this measurement.	**1** **1**
(d)	Simplify by rationalising the denominator: $\frac{5}{2+\sqrt{3}}$	**2**

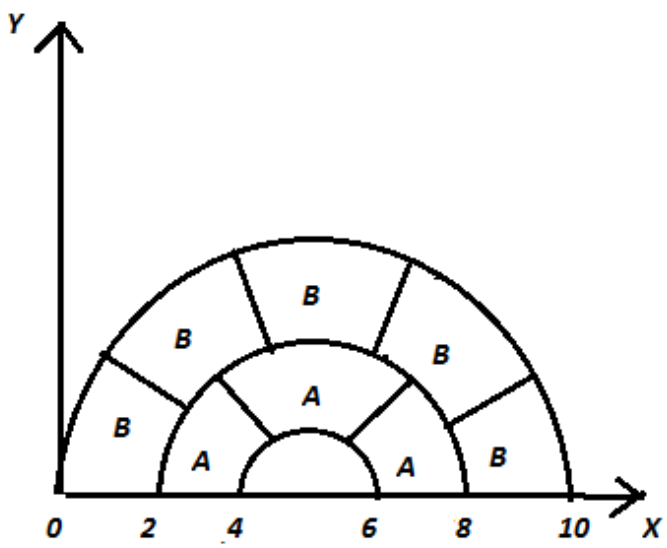
(e)	Calculate $(3^{-1}+3^{-2}+3^{-3})^{-2}$ leaving your answer as a mixed numeral.	**2**
(f)	Find the surface area of the following solid:  	**2**
(g)	Expand and simplify $(2x-1)(3x+2)$	**2**

Section 4. (13 marks)

(a)	Simplify $\dfrac{12\sqrt{198}}{15\sqrt{44}}$	**2**
(b)	Simplify $\dfrac{2}{x^{-1}}$	**1**
(c)	Expand and simplify $(\sqrt{5}+3\sqrt{6})(2\sqrt{2}-4\sqrt{3})$	**2**
(d)	A car is travelling at 40 m/s. This means: A. It will take travel 0.12 km in 3 seconds B. It will travel 3.2 km in 1 minute C. It will travel 0.4 metres in 1 millisecond D. It is travelling at about the same speed as an Olympic runner.	**1**

(e)	Find the volume of these prisms: (i)  (ii)  	**2** **2**
(f)	Which of the following is equivalent to $\left(2x^3+3y^2\right)\left(2x^3-3y^2\right)$? A. $4x^6-9y^4$ B. $4x^6+9y^4$ C. $4x^6-12x^3y^2+9y^4$ D. $4x^6+12x^3y^2-9y^4$	**1**
(g)	A square piece of cardboard has an area of 36 cm^2. A square of 1 cm^2 is cut from each corner. The sides are then folded to make an open box. What is the volume of this box?	**2**

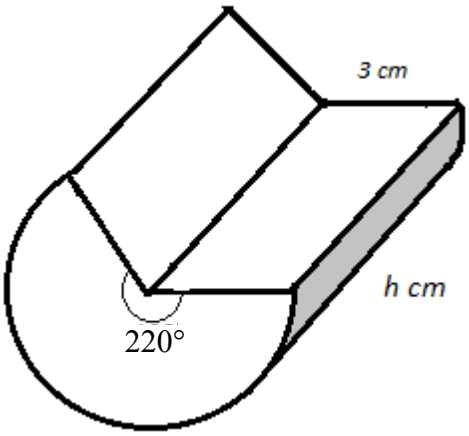
Section 5. (13 marks)

(a)	If $50 = 2^x \times 5^y$ then find 10^{xy}.	**2**
(b)	Simplify the following: $(2a+b)^2 - (2a-b)^2$	**2**
(c)	In the diagram the curved lines are semi-circles. All areas marked 'A' are equal to each other and all areas marked 'B' are equal to each other. Find the ratio of Area A to Area B. 	**2**

(d)	Before beginning an exam, Jerry calculated that if he were to spend 10 minutes solving each of the 12 problems, then he would be able to complete the exam in 2 hours. During the exam Jerry found some questions difficult. They took him twice as long as he had previously calculated. He found the remaining problems easy and these ones took only half as long as he had calculated before. He completed the 12 problems in exactly 2 hours. How many problems did Jerry find difficult?	**2**
(e)	In a Year 12 class 12 students study Physics (P), 16 study Chemistry (C) and 21 study Maths (M). Only 3 study all subjects. There are 5 who study both Physics and Chemistry. There are 8 studying Maths and Physics and 12 are studying Maths and Chemistry. If everyone studies at least one of these subjects, how many are there in the class who are studying only one of the three subjects - that is Maths or Physics or Chemistry? Draw a Venn Diagram to show this information and answer the question.	**2**

(f)	Louis bought 7 tonnes of pumpkins at $75 per tonne. He sold 5 tonnes at $94.50 per tonne. At what price must he sell the remaining pumpkins to make an overall profit of 22% ?	**3**

Section 6 (13) marks

(a)	(i) Find the height, h, of this prism, given that its volume is 96π cm^3. 	**2**
	(ii) Hence find the surface area of the above solid.	**2**

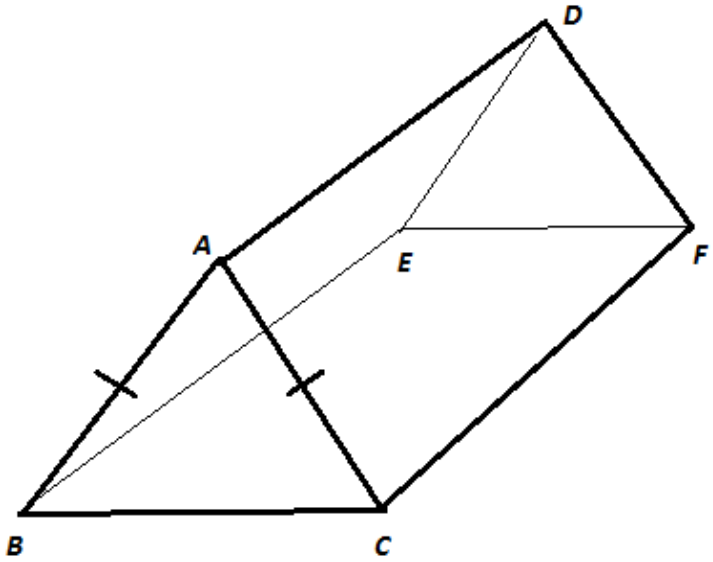
(b)	Rationalise the denominator and simplify: $\frac{1}{2\sqrt{2}-\sqrt{3}}-\frac{1}{2\sqrt{2}+\sqrt{3}}$	**2**
(c)	Simplify: $\frac{5\sqrt{3m^3n}}{2\sqrt{6m^4n^2}}\div\frac{\sqrt{2m^5n^8}}{6\sqrt{mn^5}}$	**3**

(e)	Simplify: $\frac{a+3}{4a} - \frac{5-3a}{6a} - \frac{2a-3}{8}$	**2**
(f)	Show that $\frac{2\times 3^{n} - 3^{n+2}}{8^{n+3} - 8^{n+1}} = -\frac{3^{n-2}}{2^{3n+3}}$	**2**

Section 7 (13 Marks)

(a)	A Jersey cow produces milk with 4% butter fat and 12% non-fat solids whilst a Fresian cow produces milk with 3% butter fat and 10 % non-fat solids. My Jersey can provide 9L of milk per day but my Fresian provides 15L of milk per day. If I mix all the milk from both cows together, what percentage of butter fats and non-fat solids will be in the mixture?	**2**
(b)	Expand and simplify: $\left(9\sqrt{x^2y}-5\sqrt{xy^2}\right)\left(9\sqrt{x^2y}+5\sqrt{xy^2}\right)$	**2**
(c)	Which of the following is equivalent to $64a^{\frac{2}{3}}$? A. $16\sqrt[3]{a^2}$ B. $64\sqrt{a^3}$ C. $64\sqrt[3]{a^2}$ D. $512\sqrt{a^3}$	**1**
(d)	If $(3x+P)^2=9x^2-Mx+16$ (where M is positive) then A. $P=-4$ and $M=12$ B. $P=-4$ and $M=24$ C. $P=4$ and $M=12$ D. $P=4$ and $M=24$	**1**

(d)	Show that $\sqrt{2+\sqrt{2}}+\sqrt{2-\sqrt{2}} \leq 2\sqrt{2}$ WITHOUT using a calculator.	**3**

(e)	Find the volume in exact surd form of this triangular prism, given that the triangular base is an isosceles triangle as shown, where $BC = \left(8+\sqrt{6}\right)$ cm, $AB = AC = \left(10+\frac{\sqrt{6}}{5}\right)$ cm and $CF = \left(8-\sqrt{6}\right)$ cm.  	**4**

End of paper

Use this space if you wish to **REWRITE** any answers

Clearly *indicate* the **QUESTION** number.

Question	

Use this space if you wish to **REWRITE** any answers

Clearly *indicate* the **QUESTION** number.

Question	