SYDNEY BOYS HIGH SCHOOL

MOORE PARK, SURRY HILLS

Year 8

Yearly Examination 2007

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

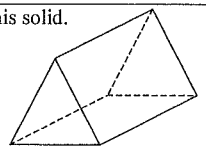
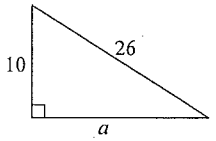
Examiner: *P. Bigelow*

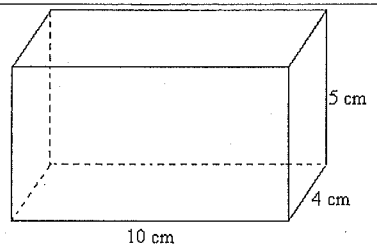
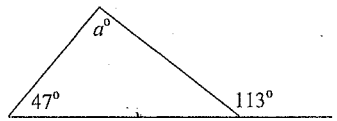
NAME:

Class	Teacher	
8 A	Mr Choy	
8 B	Mr Hespe	
8 C	Mr Fuller	
8 1	Ms Ward	
8 2	Ms Evans	
8 3	Ms Roessler	

Section	Mark
A	**/20**
B	**/20**
C	**/20**
D	**/20**
E	**/20**
F	**/20**
Total	**/120**

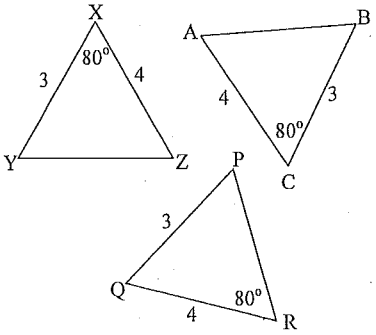
Section A (20 marks)

	Question	Answer	Marks
1	Name this solid. 		1
2	What percentage of \$300 is \$15?		1
3	Write in ascending order (i.e. lowest to highest) 7%, 0.6, 0.09 and $\frac{14}{25}$.		1
4	 Find the value of a.		1
5	Evaluate $\frac{\sqrt{16.4}}{9.7 \div (3.1)^2}$ (correct to one decimal place).		1
6	Which two integers are closest to $\sqrt{300}$?		1
7	State whether **A:** Acute, **O:** Obtuse or **R:** Reflex. (a) 95° (b) 200°	(a) (b)	2
8	Express $6\frac{1}{4}\%$ as a fraction in simplest form.		1
9	Find in MOD 7 (a) $1-6$ (b) $3 \div 4$	(a) (b)	2
10	Which of the following three statements is true? **A:** $3^4 \times 2^4 = 6^4$ **B:** $3^4 \times 2^4 = 6^8$ **C:** Neither A nor B.		1

11	Simplify $\frac{4a+8}{16}$.		1
12	 Find the: (a) Volume (b) Surface area of the rectangular prism.	(a) (b)	2
13	Write an equation to represent: "The number three less than x is equal to one third of x."		1
14	\$84 is divided in the ratio 4:3. What is the larger amount?		1
15	Solve $\frac{x-7}{3}=8$.		1
16	If $x=-\frac{1}{2}$, find the value of $16x^3$.		1
17	 Find the value of a.		1

End of Section A

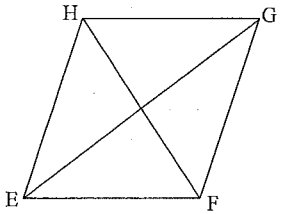
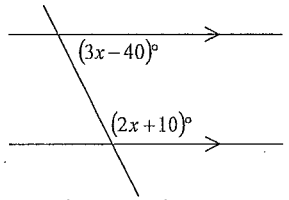
Section B (20 marks)

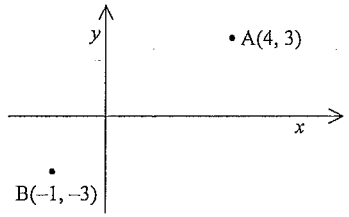
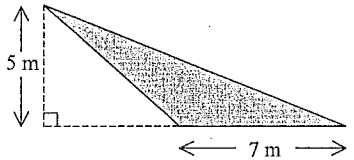
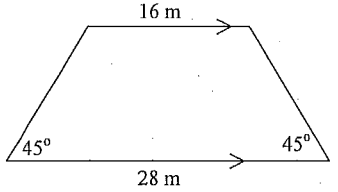
	Question	Answer	Marks
1	The point $(-2, a)$ lies on the line $2x-y+5=0$. Find the value of a.		1
2	Graph the solution to $4-x>3x$ on a number line.		1
3	Simplify (a) $4x-1-x-9$ (b) $3a^2\times 2a^3$ (c) $4a^3b\div 2ab$	(a) (b) (c)	3
4	Decrease 0.95 by 15% (answer correct to two decimal places).		1
5	(a) name a pair of congruent triangles (with vertices in corresponding order). (b) State which test you have used. 	(a) (b)	1 1

6	What fraction is midway between $\frac{1}{5}$ and $\frac{1}{7}$?		1
7	If $v = u + at$, find t when $v = 48$, $u = 12$ and $a = 4$?		1
8	An article is bought for \$14.40 and sold for \$16.80. Express the profit as a percentage of the cost price.		2
9	Solve $\|3 - x\| = 5$.		2
10	Expand and simplify (a) $2(x-y)-3(y-2x)$ (b) $(x-3)(2x+5)$	(a) (b)	2 2
11	Find all values of x in MOD 5 such that $x^2 = 1$.		2

End of Section B

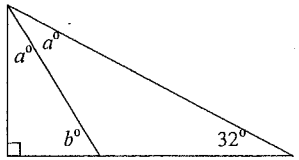
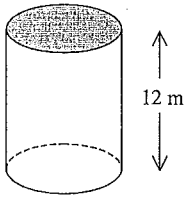
Section C (20 marks)

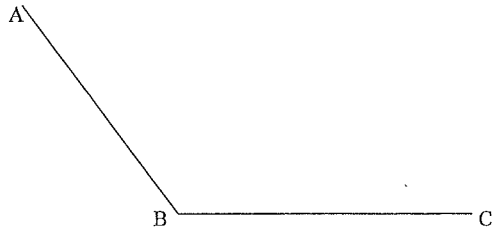
	Question	Answer	Marks
1	Factorise fully $4a^3b^2 - 12ab^4$		1
2	Simplify the ratio 80 metres to 4 kilometres		1
3	 The triangles EFH and FGH are equilateral. Triangle EGH must be **A:** isosceles **B:** equilateral **C:** scalene **D:** right-angled		2
4	 (a) Write an equation to represent the information. (b) Solve for x.	(a) (b)	2
5	For every 40 000 valves manufactured by a company, it is found that on average 48 are faulty. How many faulty valves could be expected in a batch of 90 000?		1
6	Change 800 kph to metres per second.		2

7	 Find the exact length of AB.		2
8	My 8% commission on the sale of a car was \$2400. For how much did the car sell?		2
9	Write down the number ten less than half a million.		1
10	 Find the shaded area.		1
11	A circle has diameter 3 metres. What is its circumference to the nearest centimetre?		1
12	A roadmap is drawn to a scale of 10mm to 1 km. How far apart are two towns if they are 75mm apart on the map?		1
13	If $\sqrt{A} = n$, find $4A$ in terms of n.		1
14	 Find the area of the trapezium.		2

End of Section C

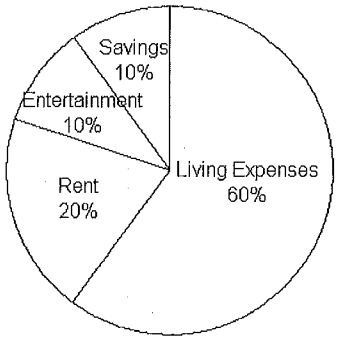
Section D (20 marks)

	Question	Answer	Marks
1	 Find the value of b.		2
2	Simplify $\frac{y-1}{6-6y}$.		1
3	Find the shaded area if this cylinder has a volume of 444 m^3. 		1
4	Use a pair of compasses and a ruler to construct a rhombus ABCD where AB is the interval below and $\angle ABC = 120°$. (Make sure the construction marks are clearly shown.) A ——— B		3

5	Use a protractor to measure $\angle ABC$ to the nearest degree.  		1
6	Simplify $\frac{x+1}{2}+\frac{x-3}{5}$.		2
7	18 litres of sugared water contains 10% sugar by weight. How much water must be added to make a 4% sugar solution?		2
8	Given the following scores 4, -1, 0, 2, 6, 3, 4, -1, -2, 1, -1, 9. Write down the (a) Range (b) Mode (c) Median (d) Mean	(a) (b) (c) (d)	4
9	A firm which caters for parties works out its charges using the formula. $C = 100 + 12n$ where $\$C$ is the total charge for a party of n guests. (a) Find the total amount charges for a party of 50 guests. (b) For the party in (a) calculate the average charge per guest. (c) At another party the charge per guest was $16. How many were at the party?	(a) (b) (c)	4

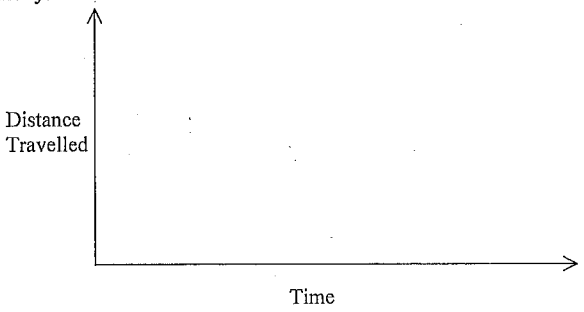
End of Section D

Section E (20 marks)

	Question	Answer	Marks
1	If $0 < b < a$ which of the following must be negative? **A:** $-b+a$ **B:** $-(b+a)$ **C:** $-(b-a)$ **D:** $(-b-a)^2$		2
2	Find $x : y$ if x is 30% of y.		2
3	 A person's wages are spent as shown in the pie-chart. What is the ratio of the living expenses to rent?		2
4	Solve $\frac{4}{a+1}=\frac{3}{a-1}$.		2
5	Simplify $(a-b)^2-(a+b)(a-b)$.		2

6	A bag contains 4 red, 3 white and 5 green marbles. A marble is drawn at random. What is the probability that it is: (a) white (b) not red	(a) (b)	2
7	(a) Complete the table for the equation $y = 3x - 1$. (b) Graph the line $y = 3x - 1$ on the number plane.		2 2
8	Draw a travel graph to represent the story. "Mike set out on a leisurely walk after a while he started to jog. He took a rest break at about the half-way mark. He then walked for a while before sprinting the last part of the journey."		2

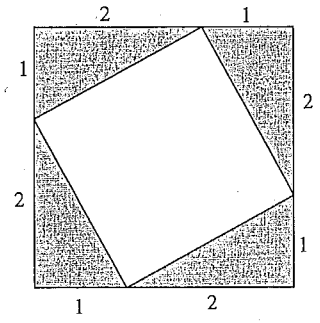
x	-2	-1	0	1	2
y					

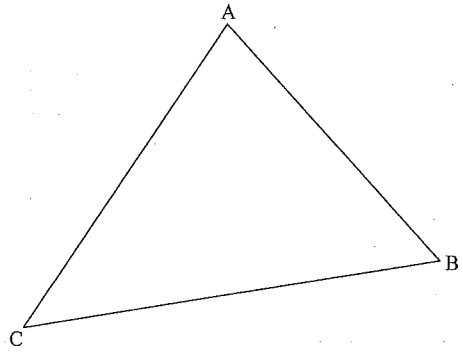
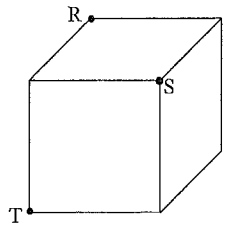
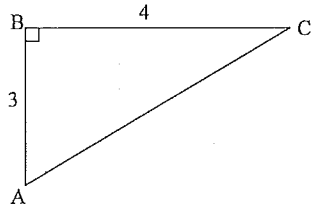


9	Draw a stem-and-leaf plot for the following set of test marks. 34 46 29 30 42 47 41 32 28 33 45 36 38 36 43 27 31 28 33 29 40 36 41 37 39		2

End of Section E

Section F (20 marks)

	Question	Answer	Marks
1	If $x+3=x+4$ then **A:** $x=0$ **B:** $x=1$ **C:** x may be any number. **D:** the equation has no solutions.		2
2	Solve $\frac{4x}{3}-\frac{x}{5}=\frac{1}{2}$.		2
3	 What fraction of the square has been shaded?		2

4	Construct a circle which passes through the vertices of ΔABC. (Show all construction marks.)  		3
5	 RS and ST are diagonals on two faces of a cube. Find the size of the angle RST.		2
6	 Find the shortest distance from B to the line AC.		3

7	In a class of 30, 15 boys play Rugby and 9 boys play Cricket. There are 4 boys who play both Rugby and Cricket. A boy is selected at random: find the probability that he plays neither Rugby nor Cricket.		3
8	In his last game of ten-pin bowling, Bob scored 199 and this raised his average over the season from 177 to 178. What must he score in his next game in order to raise his average to 179?		3

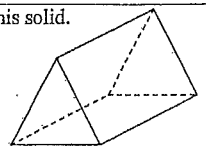
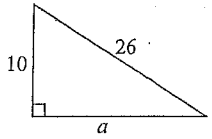
End of Exam

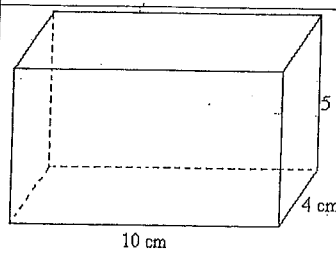
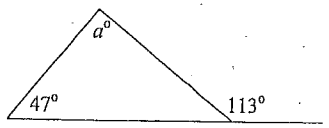
Extra Working Space

Question	Working

SBHS - Yr8 Yrly - 2007 Solutions

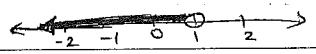
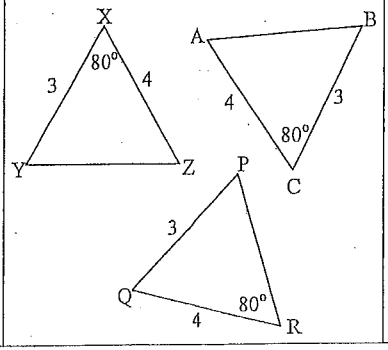
Section A (20 marks)

	Question	Answer	Marks
1	Name this solid. 	triangular prism	1
2	What percentage of \$300 is \$15?	5%	1
3	Write in ascending order (i.e. lowest to highest) 7%, 0.6, 0.09 and $\frac{14}{25}$	7%, 0.09, $\frac{14}{25}$, 0.6	1
4	 Find the value of a.	$\sqrt{26^2-100} = a$ $a = 24$	1
5	Evaluate $\frac{\sqrt{16.4}}{9.7 \div (3.1)^2}$ (correct to one decimal place).	4.0	1
6	Which two integers are closest to $\sqrt{300}$?	17, 18	1
7	State whether **A:** Acute, **O:** Obtuse or **R:** Reflex. (a) 95° (b) 200°	(a) O (b) R	2
8	Express $6\frac{1}{4}\%$ as a fraction in simplest form.	$\frac{1}{16}$	1
9	Find in MOD 7 (a) $1-6$ (b) $3 \div 4$	(a) 2 (b) 6	2
10	Which of the following three statements is true? A: $3^4 \times 2^4 = 6^4$ B: $3^4 \times 2^4 = 6^8$ C: Neither A nor B.	A	1

11	Simplify $\frac{4a+8}{16}$.	$\frac{a+2}{4}$	1
12	 Find the: (a) Volume (b) Surface area of the rectangular prism.	(a) $200cm^3$ (b) $(50 + 20 + 40) \times 2$ $220cm^2$	2
13	Write an equation to represent: "The number three less that x is equal to one third of x."	$x - 3 = \frac{x}{3}$	1
14	\$84 is divided in the ratio 4:3. What is the larger amount?	\$48	1
15	Solve $\frac{x-7}{3} = 8$. $x - 7 = 24$	31	1
16	If $x = -\frac{1}{2}$, find the value of $16x^3$.	$16 \times -\frac{1}{8} = -2$	1
17	 Find the value of a.	$a^\circ = 113^\circ - 47^\circ$ $= 66^\circ$	1

End of Section A

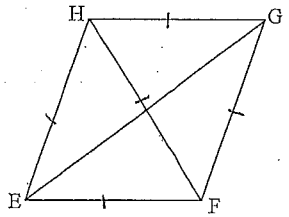
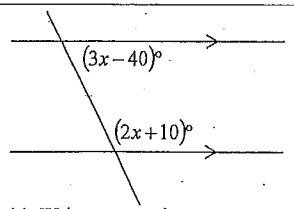
Section B (20 marks)

	Question	Answer	Marks
1	The point $(-2,a)$ lies on the line $2x-y+5=0$. Find the value of a.	$2(-2)-(a)+5=0$ $-4-a+5=0$ $-a+1=0$ $a=1$	1
2	Graph the solution to $4-x>3x$ on a number line.	$4-x>3x$ $4>4x$ $1>x$ $x<1$ 	1
3	Simplify (a) $4x-1-x-9$ (b) $3a^2\times 2a^3$ (c) $4a^3b+2ab$	(a) $3x-10$ (b) $6a^5$ (c) $2a^2$	3
4	Decrease 0.95 by 15% (answer correct to two decimal places).	$0.95\times 0.85=0.8075$ $=0.81$	1
5	(a) name a pair of congruent triangles (with vertices in corresponding order). (b) State which test you have used. 	(a) $\triangle ABC$ & $\triangle ZYX$ (b) SAS two sides and the included angle are equal.	1 1

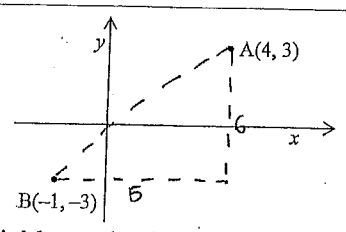
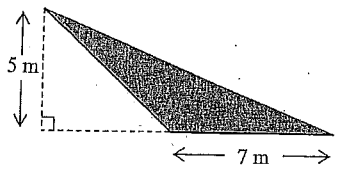
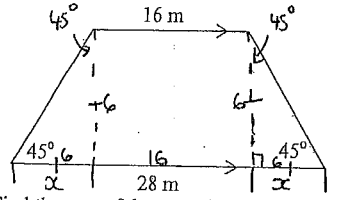
6	What fraction is midway between $\frac{1}{5}$ and $\frac{1}{7}$?	$\frac{1}{5}=\frac{7}{35}$ $\frac{1}{7}=\frac{5}{35}$ $\therefore \frac{6}{35}$ is midway between $\frac{1}{5}$ and $\frac{1}{7}$	1
7	If $v=u+at$, find t when $v=48$, $u=12$ and $a=4$?	$48=12+4t$ $36=4t$ $t=9$	1
8	An article is bought for \$14.40 and sold for \$16.80. Express the profit as a percentage of the cost price.	profit $=16.8-14.4$ $=2.4$ $\frac{2.4}{14.4}\times 100\% = 16\frac{2}{3}\%$	2
9	Solve $\lvert 3-x\rvert=5$.	$x=8$ or -2	2
10	Expand and simplify (a) $2(x-y)-3(y-2x)$ (b) $(x-3)(2x+5)$	(a) $2x-2y-3y+6x$ $=8x-5y$ (b) $2x^2+5x-6x-15$ $=2x^2-x-15$	2 2
11	Find all values of x in MOD 5 such that $x^2=1$. $1\times 1=1$ $2\times 2=4$ $3\times 3=4$ $4\times 4=1$	$\therefore x=1,4$	2

End of Section B

Section C (20 marks)

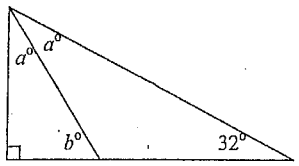
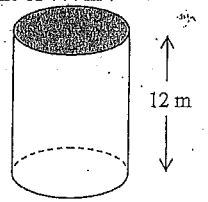
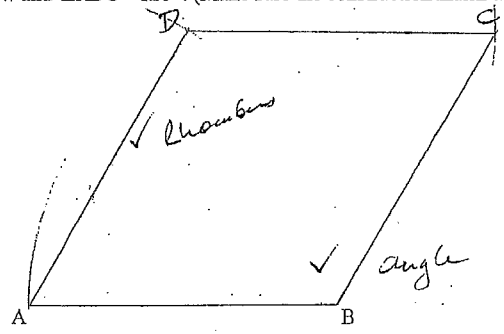
	Question	Answer	Marks
1	Factorise fully $4a^3b^2 - 12ab^4$	$4ab^2(a^2 - 3b^2)$ ①	1
2	Simplify the ratio 80 metres to 4 kilometres	80 : 4000 1 : 50 ①	1
3	 The triangles EFH and FGH are equilateral. Triangle EGH must be **A:** isosceles **B:** equilateral **C:** scalene **D:** right-angled	A isosceles ②	2
4	 (a) Write an equation to represent the information. (b) Solve for x.	(a) $(3x + 40) + (2x + 10) = 180°$ ① (b) $3x - 40 + 2x + 10 = 180°$ $5x - 30 = 180°$ $5x = 210°$ $x = 42°$ ①	2
5	For every 40 000 valves manufactured by a company, it is found that on average 48 are faulty. How many faulty valves could be expected in a batch of 90 000?	48 : 40000 ∴ 108 ① ∴ 12 : 10 000 faulty 108 : 90000	1
6	Change 800 kph to metres per second. 800 k ph = 800 000 ph ①	= 222.2 mps ①	2

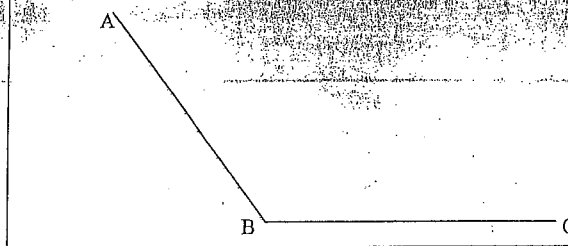
-½ for 6 or 5 error

7	 Find the exact length of AB.	$AB^2 = 6^2 + 5^2$ −1 for ans only given as a decimal. $= 36 + 25$ $= 61$ ① $AB = \sqrt{61}$ ① −2 for ↑ no working.	2
8	My 8% commission on the sale of a car was $2400. For how much did the car sell?	8% = $2400 ① ∴ 1% = $300 100% = $30,000 ①	2
9	Write down the number ten less than half a million.	499,990 ①	1
10	 Find the shaded area.	$A = \frac{1}{2} \times 7 \times 5$ $= 17.5 m^2$ ①	1
11	A circle has diameter 3 metres. What is its circumference to the nearest centimetre? not covered	$C = \pi d$ all given $= 3\pi$ 1 mark RE $= 9.42 m$	1
12	A roadmap is drawn to a scale of 10mm to 1 km. How far apart are two towns if they are 75mm apart on the map?	10mm : 1km the towns are 7.5km apart. ①	1
13	If $\sqrt{A} = n$, find $4A$ in terms of n. $\therefore A = n^2$	$\therefore 4A = 4n^2$ ①	1
14	 Find the area of the trapezium.	$x + x = 12$ $\therefore x = 6$ $A = \frac{1}{2} \times 6 \times (16 + 28)$ ① $= 3 \times 44$ ½ for $x = 6$. $= 132 m^2$ ① ½ for formula incorrect.	2

End of Section C

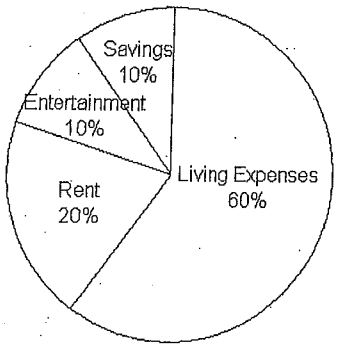
Section D (20 marks)

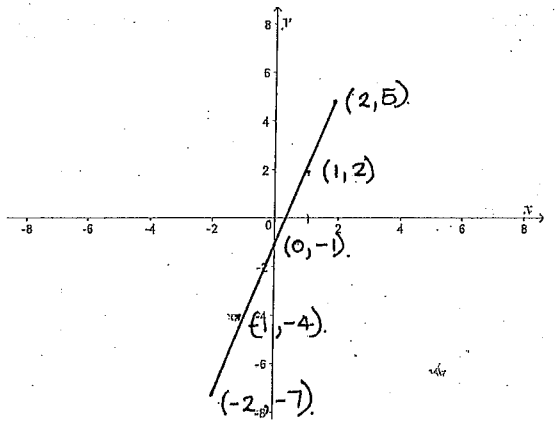
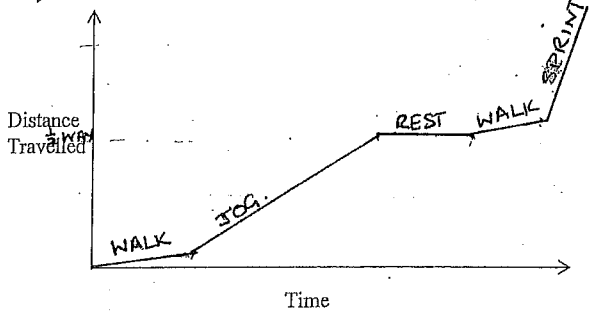
	Question	Answer	Marks
1	 Find the value of b.	$2a = 90 - 32$ $= 58$ $a = 29$ ✓ $b = 90 - 29$ $= 61$ ✓	2
2	Simplify $\frac{y-1}{6-6y}$.	$= -\frac{1}{6} \cdot \frac{1-y}{1-y}$ $= -1/6$ ✓	1
3	Find the shaded area if this cylinder has a volume of 444 m^3. 	$V = Ah$ $A = \frac{444}{12}$ $= 37\ m^2$ ✓	1
4	Use a pair of compasses and a ruler to construct a rhombus ABCD where AB is the interval below and $\angle ABC = 120°$. (Make sure the construction marks are clearly shown.)  ✓ Method ✓ Rhombus ✓ angle		3

5	Use a protractor to measure $\angle ABC$ to the nearest degree. 	127° ✓	1
6	Simplify $\frac{x+1}{2} + \frac{x-3}{5}$. $\frac{5(x+1)+2(x-3)}{10}$ ✓	$\frac{5x+5+2x-6}{10} = \frac{7x-1}{10}$ ✓	2
7	18 litres of sugared water contains 10% sugar by weight. How much water must be added to make a 4% sugar solution? 1.8 L is 4% of new sol. ✓ 0.45 L is 1% of new sol	New sol is 45 L ∴ 27 litres must be added.	2
8	Given the following scores 4, -1, 0, 2, 6, 3, 4, -1, -2, 1, -1, 9. Write down the (a) Range $9-(-2)$ (b) Mode (c) Median 6½ position (d) Mean	(a) 11 ✓ (b) −1 ✓ (c) 1½ ✓ (d) $\frac{24}{12} = 2$ ✓	4
9	A firm which caters for parties works out its charges using the formula. $C = 100 + 12n$ where $\$C$ is the total charge for a party of n guests. (a) Find the total amount charges for a party of 50 guests. (b) For the party in (a) calculate the average charge per guest. (c) At another party the charge per guest was \$16. How many were at the party?	(a) $100 + 12 \times 50 = \$700$ ✓ (b) Average $= \frac{700}{50}$ $= \$14$ ✓ (c) $16n = 100 + 12n$ ✓ $4n = 100$ $n = 25$ 25 at party. ✓	4

End of Section D

Section E (20 marks)

	Question	Answer	Marks
1	If $0 < b < a$ which of the following must be negative? **A:** $-b+a$ **B:** $-(b+a)$ **C:** $-(b-a)$ **D:** $(-b-a)^2$	B.	2
2	Find $x : y$ if x is 30% of y.	30:100 3:10	2
3	 A person's wages are spent as shown in the pie-chart. What is the ratio of the living expenses to rent?	60:20 3:1.	2
4	Solve $\frac{4}{a+1} = \frac{3}{a-1}$.	$4(a-1) = 3(a+1)$ $4a-4 = 3a+3$ $a = 7$ $a=7$.	2
5	Simplify $(a-b)^2-(a+b)(a-b)$.	$a^2-2ab+b^2-(a^2-b^2)$ $= -2ab+b^2-b^2$. $= b^2-2ab$.	2

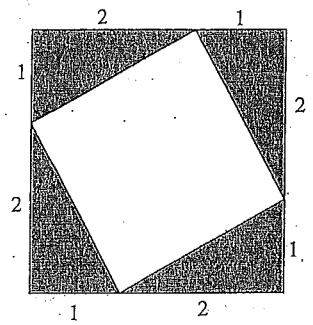
6	A bag contains 4 red, 3 white and 5 green marbles. A marble is drawn at random. What is the probability that it is: (a) white (b) not red	(a) $P(W) \frac{3}{12} = \frac{1}{4}$. (b) $P(\bar{R}) = 1 - P(R) = \frac{8}{12} = \frac{2}{3}$	2
7	(a) Complete the table for the equation $y = 3x-1$. | x | -2 | -1 | 0 | 1 | 2 | | y | -7 | -4 | -1 | 2 | 5 | (b) Graph the line $y = 3x-1$ on the number plane.		2 2
8	Draw a travel graph to represent the story. "Mike set out on a leisurely walk after a while he stated to jog. He took a rest break at about the half-way mark. He then walked for a while before sprinting the last part of the journey."		2

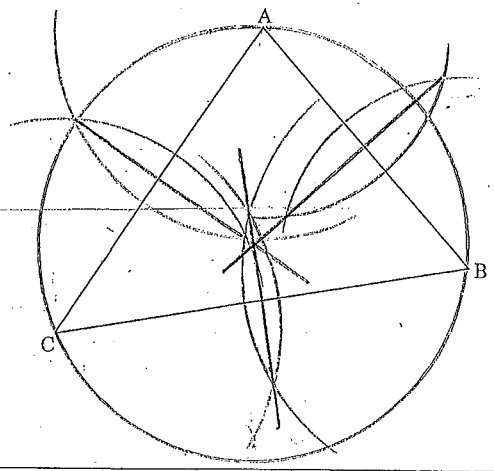
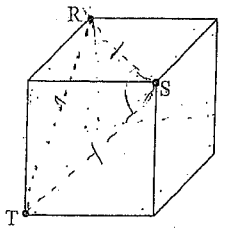
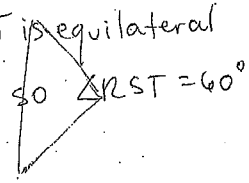
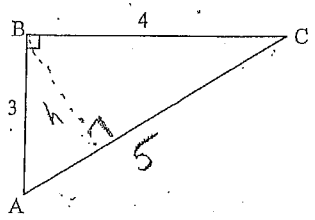
9	Draw a stem-and-leaf plot for the following set of test marks.						2
	34	46	29	30	42		
	47	41	32	28	33		
	45	36	38	36	43		
	27	31	28	33	29		
	40	36	41	37	39		

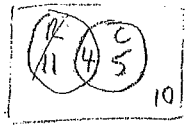
STEM	LEAF
2	7 8 8 9 9
3	0 1 2 3 3 4 6 6 6 7 8 9
4	0 1 1 2 3 5 6 7

End of Section E

Section F (20 marks)

	Question	Answer	Marks
1	If $x+3=x+4$ then **A:** $x=0$ **B:** $x=1$ **C:** x may be any number, **D:** the equation has no solutions.	D	2
2	Solve $\frac{4x}{3}-\frac{x}{5}=\frac{1}{2}$. $\frac{40x}{30}-\frac{6x}{30}=\frac{15}{30}$	$34x=15$ $x=\frac{15}{34}$	2
3	 What fraction of the square has been shaded?	4 Δs = 2 rectangles $= 2 \times (2 \times 1)$ Area of shaded = 4 Fraction shaded = $\frac{4}{9}$	2

4	Construct a circle which passes through the vertices of ΔABC. (Show all construction marks.) 		3
5	 RS and ST are diagonals on two faces of a cube. Find the size of the angle RST.	ΔRST is equilateral so $\angle RST = 60°$ 	2
6	 Find the shortest distance from B to the line AC.	Area ABC $= \frac{1}{2}bh$ $= \frac{1}{2} \times 4 \times 3$ $= 6$ $6 = \frac{1}{2}(5h)$ $12 = 5h$ $h = \frac{12}{5}$	3

7	In a class of 30, 15 boys play Rugby and 9 boys play Cricket. There are 4 boys who play both Rugby and Cricket. A boy is selected at random: find the probability that he plays neither Rugby nor Cricket.	 $P(\tilde{R} \cap \tilde{C}) = \frac{1}{3}$	3
8	In his last game of ten-pin bowling, Bob scored 199 and this raised his average over the season from 177 to 178. What must he score in his next game in order to raise his average to 179? Let the no. of games be x $177x + 199 = 178(x+1)$ $177x + 199 = 178x + 178$ $x = 21$ So $178 \times 22 + \text{score} = 179 \times 23$	Score = 201	3

End of Exam