Name: _____ Class: _____

St George Girls High School

Year 9

Common Test 1

May 2007

Mathematics

Advanced Course

Time Allowed: 75 minutes

Instructions:

- Set out work clearly.
- Show all working when required.
- Calculators may be used.

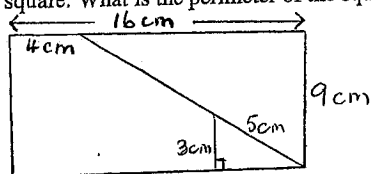
Section A	/15
Section B	/60
Question 1	/15
Question 2	/15
Question 3	/15
Question 4	/15
Total	/75

Part A

15 marks
Answer only in the Answer Column

Question	Answer
1. Which is the better buy: 1kg box of dog biscuits for \$4.85 or 750g box of dog biscuits for \$3.60?	
2. Write the meaning of $x^{\frac{3}{2}}$	
3. The expression $\frac{12+\square}{5}$ where $\square$ is a whole number, has a value between 7 and 9. What is a possible value for $\square$?	
4. A sheet of newspaper is 6×10^{-3} mm thick. How many sheets make a pile 2.1cm high?	
5. Make x the subject of the formula $y = mx + b$	
6. Express $3\frac{1}{2}\%$ as a decimal numeral.	
7. Select the correct solution for the equation $12 - 5k = 2k - 9$ A. $k = 1$ B. $k = \frac{3}{7}$ C. $k = 3$ D. $k = 7$	
8. Simplify $\sqrt[4]{16x^{16}}$.	

Part A (cont'd)

Question	Answer
9. In a cricket match, Jean scored 57 runs, which was 22% of the team total. How many runs did the team make?	
10. Solve $8x^2 = 50$	
11. Factorise fully $3(x+1)+3(y+1)$	
12. Write with a positive index $3x^{-2}$	
Questions 13 and 14 relate to the following spreadsheet.	
13. What are the contents of cell reference H4?	
14. The formula in H5 is = B5+C5+D5+E5+F5+G5. Cells H5:H9 are selected and from the Edit menu Fill/Down is selected. If you select cell H8 what would the formula bar show?	
15. This rectangle is cut along the lines shown and reformed into a square. What is the perimeter of the square? 	

	A	B	C	D	E	F	G	H
1	Week 1							
2								
3				Class				
4	Date	Yr 7	Yr 8					Total
5	4/08/04	15.5	42.75	36.6	45.2	2.4	13.2	
6		32	45	23.5	14.8	25.6	34	
7		17	15.3	36.2	31	53	16.6	
8		36	27.8	42	23.45	21	12	
9		53	86	13.8	17.85	34.4	64.5	
10	Total							

Part B

Question 1 (15 marks) – Show all working

Mar

6

a) Expand and simplify:

(i) $(2x-1)(x+3)$ (ii) $\left(x^2+\frac{1}{x^2}\right)^2$ (iii) $7-(x+2)(x-2)$

b) Simplify (give your answers with positive indices)

(i) $\frac{100x^2y^2}{5xy^3}$ (ii) $\left(b^3\right)^2 \div \left(b^2\right)^4$

c) Simplify:

(i) $5^{3+x} \div 5^{1-2x}$ (ii) $\left(\frac{8}{x^9}\right)^{-\frac{1}{3}}$

d) Solve $4^{x+2} = 32$

Question 2 (15 marks) – Show all working

Marks

a) (i) Write in ascending order 3.7×10^{0}, 5.7×10^{4}, 8.2×10^{-2}, 4.9×10^{-4} 2

(ii) Express in scientific notation 1 nanosecond = $\frac{1}{1000000000}$ seconds.

b) The sun loses 2.1×10^{10} kg of mass every 5 seconds and converts it into energy. 4

(i) Express the rate of mass loss in kg/h (using scientific notation and 3 significant figures)

(ii) Calculate what mass the sun will lose every year (use 365 days = 1year).

Marks

Question 2 (cont'd)

c) (i) The average reaction time for a driver in an emergency is 2.5 seconds. How far will a car travel in this time at a speed of 80km/h (to the nearest metre). 2

(ii) A car whose average fuel consumption is 11.5km/L, uses \$150 of petrol for a certain trip. What would the same trip have cost if it was done in a car whose average fuel consumption was 9km/L. 2

d) Evaluate $\sqrt[3]{3.6\times10^{-9}}\times\left(8.1\times10^{2}\right)^{2}$ 2

e) The new planet Gliese, just discovered, is 123×10^{12} miles away from Earth. 3

(i) If 1km = $\frac{5}{8}$ mile what is the distance to the planet in kilometres. (correct to 3 significant figures)

(ii) If a spaceship leaving the Earth could travel at the speed of light (300 000 km/s), how long would it take to reach Gliese? (give your answer in years correct to 3 significant figures.)

Question 3 (15 marks) - Show all working

Marks

a) Solve the equations: 6

(i) $5-3(x+2)=5x+9$ (ii) $\frac{14y-3}{5}=3y-1$ (iii) $\frac{x+1}{3}+\frac{x-2}{2}=5$

b) Solve each of the following and graph the solution on the number line. 4

(i) $5-3x>8$ (ii) $\frac{3x}{2}\leq\frac{4x}{3}+1$

c) Write an equation to match each problem, then solve the equation to find the answer to the problem. 5

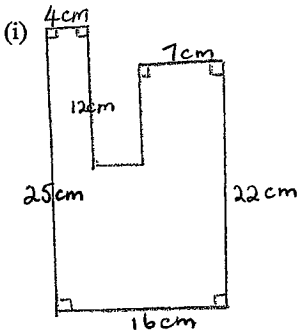
(i) The sum of 3 consecutive integers is 165. Find the smallest integer.

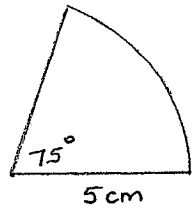
(ii) A man is twice as old as his daughter. Ten years ago he was three times as old. How old is the daughter now?

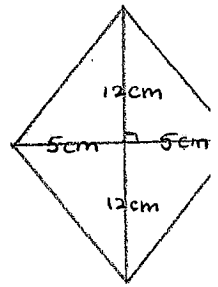
Question 4 (15 marks) – Show all working

Ma

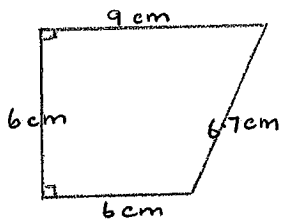
a) Find the perimeter of:

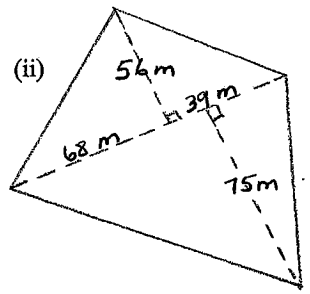
(i) 

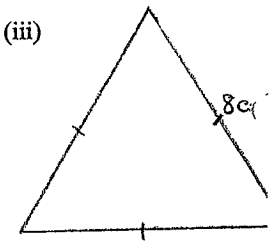
(ii) 

(iii) 

b) Find the area of:

(i) 

(ii) 

(iii) 

Marks

Question 4 – (cont'd)

c) A piece of string 90cm long is cut into two pieces of different lengths. These are then used to form a square and a rectangle with the same areas. Find the dimensions of the square and the rectangle given that they are integers. 3

End of Paper

Name: T Class:

St George Girls High School

Year 9

Common Test 1

May 2007

SOLUTIONS

Mathematics

Advanced Course

Time Allowed: 75 minutes

Instructions:

- Set out work clearly.
- Show all working when required.
- Calculators may be used.

Section A	/15
Section B	/60
Question 1	/15
Question 2	/15
Question 3	/15
Question 4	/15
Total	/75

Part A

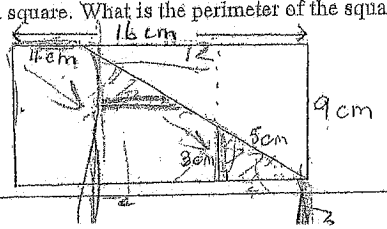
15 marks
Answer only in the Answer Column

Question	Answer
1. Which is the better buy: 1kg box of dog biscuits for \$4.85 or 750g box of dog biscuits for \$3:60?	1kg box ✓
2. Write the meaning of $x^{\frac{3}{2}}$	$(\sqrt{x})^3$ ✓
3. The expression $\frac{12+\square}{5}$ where $\square$ is a whole number, has a value between 7 and 9. What is a possible value for $\square$?	$\square > 7\times5-12 = 23$ $\square < 9\times5-12 = 33$ Andy $23 < \square < 33$
4. A sheet of newspaper is 6×10^{-3} mm thick. How many sheets make a pile 2.1cm high?	3500 ✓
5. Make x the subject of the formula $y = mx + b$	$x = \frac{y-b}{m}$ ✓
6. Express $3\frac{1}{2}\%$ as a decimal numeral.	0.035 ✓
7. Select the correct solution for the equation $12 - 5k = 2k - 9$ A. $k = 1$ B. $k = \frac{3}{7}$ C. $k = 3$ D. $k = 7$	$k = 3$ ✓
8. Simplify $\sqrt[4]{16x^{16}}$.	$2x^4$ ✓

57 = 22% × x

57/22 = x

Part A (cont'd)

Question	Answer
9. In a cricket match, Jean scored 57 runs, which was 22% of the team total. How many runs did the team make? Let "x" = TEAM TOTAL = x	259 runs ✓
10. Solve $8x^2 = 50$	±2.5 ✓
11. Factorise fully $3(x+1)+3(y+1)$	3(x+y+2) ✓
12. Write with a positive index $3x^{-2}$	$\frac{3}{x^2}$ ✓
Questions 13 and 14 relate to the following spreadsheet.	
13. What are the contents of cell reference H4?	Total ✓
14. The formula in H5 is = B5+C5+D5+E5+F5+G5. Cells H5:H9 are selected and from the Edit menu Fill/Down is selected. If you select cell H8 what would the formula bar show?	=B8+C8+D8+E8+F8+G8 ✓✓
15. This rectangle is cut along the lines shown and reformed into a square. What is the perimeter of the square? 	48 ✓ (12+12)×2 = 56

	A	B	C	D	E	F	G	H
1	Week 1							
2								
3				Class				
4	Date	Yr 7	Yr 8					Total
5	4/08/04	15.5	42.75	36.6	45.2	2.4	18.2	
6		32	45	23.5	14.8	25.6	84	
7		17	15.3	36.2	81	53	16.6	
8		36	27.8	42	23.45	21	72	
9		53	86	13.8	17.85	84.4	64.5	
10	Total							

Part B

Question 1 (15 marks) – Show all working

a) Expand and simplify:

(i) $(2x-1)(x+3)$

$= 2x^2 + 6x - x - 3$

$= 2x + 5x - 3$ ✓

(ii) $\left(x^2+\frac{1}{x^2}\right)^2$

$(x^4 + \frac{1}{x^4} + 2)$ ✓

(iii) $7-(x+2)(x-2)$

$= 7 - (x^2 - 4$

$= 7 - x^2 + 4$

$= 11 - x^2$ ✓

b) Simplify (give your answers with positive indices)

(i) $\frac{100x^2y^2}{15xy^3}$

$= \frac{20x}{y}$ ✓

(ii) $(b^3)^2 \div (b^2)^4$

$= \frac{b^6}{b^8}$

$= \frac{1}{b^2}$ ✓

c) Simplify:

(i) $5^{3+x} \div 5^{1-2x}$

$= 5^{3+x-1+2x}$

$= 5^{2+3x}$ ✓

(ii) $\left(\frac{8}{x^9}\right)^{-\frac{1}{3}}$

$= \left(\frac{x^9}{8}\right)^{\frac{1}{3}}$

$= \frac{x^3}{2}$ ✓

d) Solve $4^{x+2} = 32$

$(2^2)^{x+2} = 2^5$

$2^{2x+4} = 2^5$

$2x+4 = 5$

$2x = 1$

$\therefore x = \frac{1}{2}$ ✓

Question 2 (15 marks) – Show all working Marks

a) (i) Write in ascending order 3.7×10^{0}, 5.7×10^{4}, 8.2×10^{-2}, 4.9×10^{-4} 2

$4.9\times10^{-4}, 8.2\times10^{-2}, 3.7\times10^{0}, 5.7\times10^{4}$ ✓

(ii) Express in scientific notation 1 nanosecond $= \frac{1}{1000\,000\,000}$ seconds.

1×10^{-9} ✓

b) The sun loses 2.1×10^{10} kg of mass every 5 seconds and converts it into energy. 4

(i) Express the rate of mass loss in kg/h (using scientific notation and 3 significant figures)

1.512×10^{13}/h ✓

$(2.1\times10^{10}\times72\times60)$

(ii) Calculate what mass the sun will lose every year (use 365 days = 1year).

1.32451×10^{17}/year. ✓

Question 2 (cont'd) Marks

c) (i) The average reaction time for a driver in an emergency is 2.5 seconds. How far will a car travel in this time at a speed of 80km/h (to the nearest metre). 2

$80\times1000\div3600\times2.5$ m

56 metres. ✓

(ii) A car whose average fuel consumption is 11.5km/L, uses \$150 of petrol for a certain trip. What would the same trip have cost if it was done in a car whose average fuel consumption was 9km/L.

$150\times\frac{11.5}{9}=\$191.67$ ✓✓

d) Evaluate $\sqrt[3]{3.6\times10^{-9}}\times(8.1\times10^{2})^{2}$ 2

$=1.533\times10^{-3}\times656100$

$=1005.55$ ✓✓

e) The new planet Gliese, just discovered, is 123×10^{12} miles away from Earth. 3

(i) If 1km = $\frac{5}{8}$ mile what is the distance to the planet in kilometres. (correct to 3 significant figures)

1.98×10^{14} km

1.97×10^{14} km ✓

(ii) If a spaceship leaving the Earth could travel at the speed of light (300 000 km/s), how long would it take to reach Gliese? (give your answer in years correct to 3 significant figures.)

36.44 minutes ✓✓

~~20.2 years~~ ✗

Question 3 (15 marks) - Show all working Marks

a) Solve the equations: 6

(i) $5-3(x+2)=5x+9$

$5-3x-6=5x+9$

$-3x-1=5x+9$

$8x=-10$

$x=-\frac{10}{8}=-\frac{5}{4}$ ✓

(ii) $\frac{14y-3}{5}=3y-1$

$14y-3=15y-5$

$y=2$ ✓

(iii) $\frac{x+1}{3}+\frac{x-2}{2}=5$

$2x+2+3x-6=30$

$5x-4=30$

$5x=34$

$x=\frac{34}{5}=6\frac{4}{5}$ ✓

b) Solve each of the following and graph the solution on the number line.

(i) $5-3x>8$

$-3x>3$

$-x>-1$

$x<1$

(ii) $\frac{3x}{2}\leq\frac{4x}{3}+1$

$9x\leq 8x+6$

$x\leq 6$ ✓

c) Write an equation to match each problem, then solve the equation to find the answer to the problem. 5

(i) The sum of 3 consecutive integers is 165. Find the smallest integer.

Let the smallest integer be x

$x+x+1+x+2=165$

$3x=162$

$\therefore x=54$ ✓

(ii) A man is twice as old as his daughter. Ten years ago he was three times as old. How old is the daughter now?

Let the daughter's age now be x (mans age now is $2x$)

$2x-10=3(x-10)$

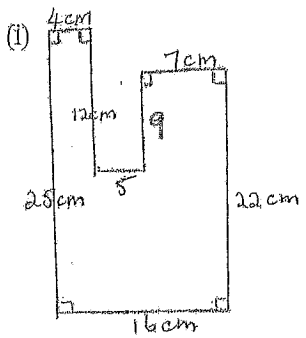
$2x-10=3x-30$

$20=x$ ✓

Question 4 (15 marks) – Show all working

a) Find the perimeter of:

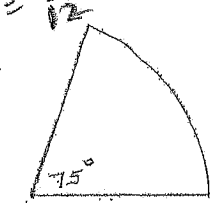
(i)



$22+4+12+25+16+7+9+5$

$=100\text{cm}$ ✓

(ii)



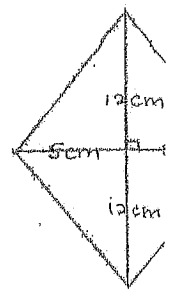
$P=\frac{25\pi}{12}+10$

$\left(\frac{75}{360}\times 2\pi\times 5\right)+10$

$=6.55+10$

$=16.55$ ✓

(iii)



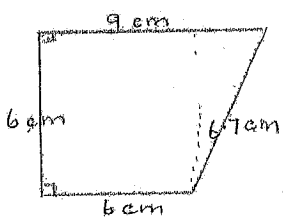
hypotenuse = (pythag

$\therefore 13\times 4$

$=52\text{cm}$ ✓

b) Find the area of:

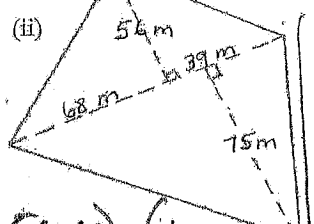
(i) $\frac{6}{2}(9+6)=A$



$36+9$

$=45\text{cm}^2$ ✓

(ii)



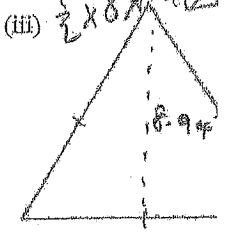
$107\times 131\times\frac{1}{2}$

$\left(\frac{1}{2}\times 56\times 68\right)+\left(\frac{1}{2}\times 56\times 39\right)+\left(\frac{1}{2}\times 68\times 75\right)+\left(\frac{1}{2}\times 39\times 75\right)$

$=1904+1092+2550+1462.5$

$=7008.5\text{m}^2$ ✓

(iii) $\frac{1}{2}\times 8\times 4\sqrt{3}$



$\text{Pla}\times 8.94$

$=\frac{1}{2}\times 8.94\times$

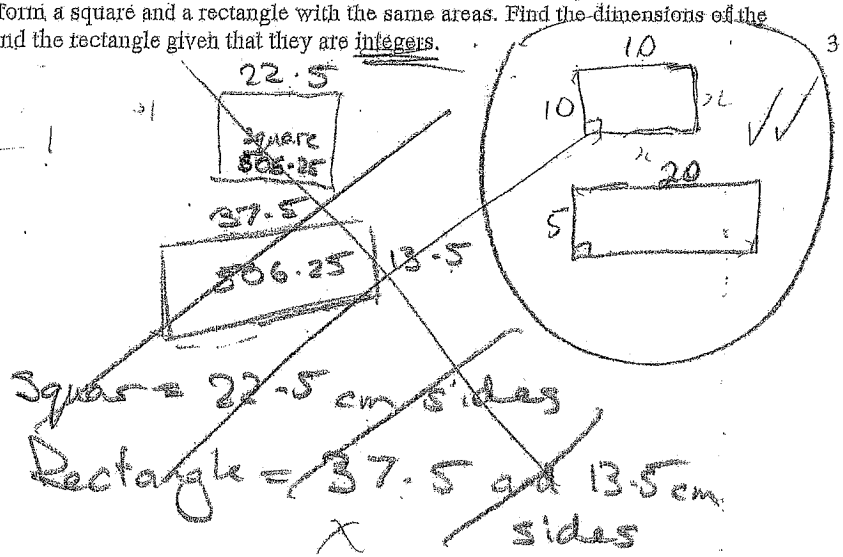
$=55.78\text{cm}^2$

$A=\frac{1}{2}\times 8\times\sqrt{48}$

$=27.7\text{cm}^2$

Question 4 – (cont'd) Marks

c) A piece of string 90cm long is cut into two pieces of different lengths. These are then used to form a square and a rectangle with the same areas. Find the dimensions of the square and the rectangle given that they are integers. 3



Square = 22.5 cm 5 sides

Rectangle = 37.5 and 13.5 cm sides

End of Paper