Name: _____ Class: _____

St George Girls High School

Year 9

Common Test 1

May 2005

Mathematics

Advanced Course

Time Allowed: 75 minutes

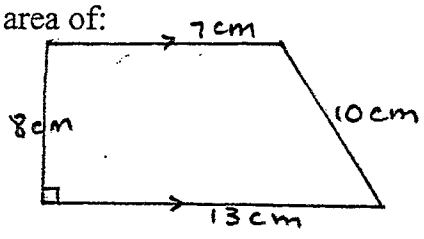
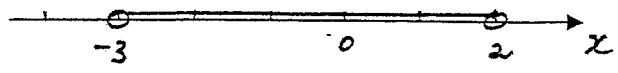
70 Marks

Instructions:

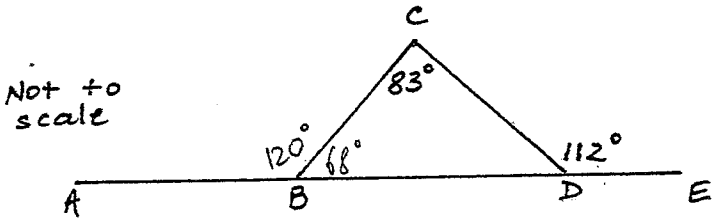
- Set out work clearly.
- Show all working when required.
- Calculators may be used.

Section A	/22
Section B	
Question 1	/12
Question 2	/12
Question 3	/12
Question 4	/12
Total	/70

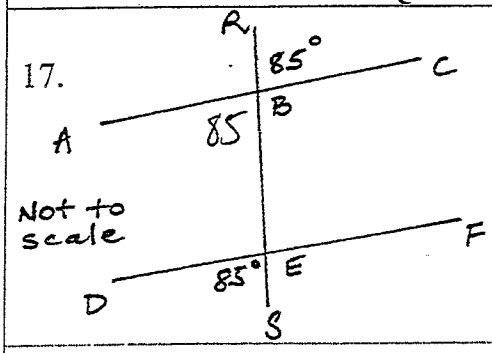
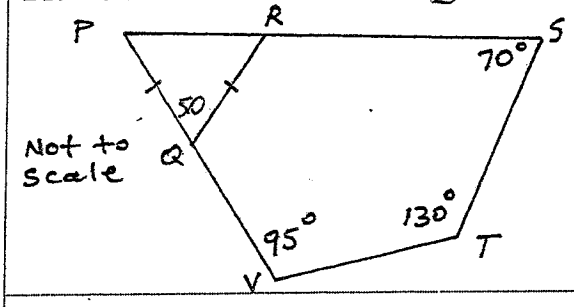
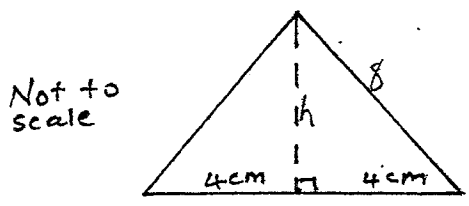
Part A
22 Questions – 1 mark each
(Answers only in the Answer Column)

Question	Answer
1. Solve $4n+10=2$	
2. Evaluate $8m^\circ$	
3. State the number of significant figures in 0.00802	
4. The speed limit on freeways is 110km/h. What is this in metres per second?	
5. Evaluate $8^{-\frac{2}{3}}$	
6. Find the area of:  Not to Scale	
7. If $t=-2$, evaluate $5t^2$	
8. Write the inequality which is represented by the graph: 	

Part A (cont'd)

Question	Answer
9. Show how you would estimate $\dfrac{34\times\sqrt[3]{28.5}}{8.7}$. Do not calculate the answer to your estimate.	
10. Find the size of $A\hat{B}C$ 	
11. If $1\frac{1}{2}L$ cost \$1.56 what is the cost per litre?	
12. Solve for x: $4^x = 32$	
13. Angela measured the width of her desk as 65.0cm What could the actual width have been?	
14. Use the formula $V=\frac{ct}{2}$ to find V when $c=2.4\times10^{6}$ and $t=3.8\times10^{-4}$. Give your answer in scientific notation.	
15. Find the radius of the circle whose perimeter is 15π cm.	
16. Solve $\dfrac{4}{x-2}=\dfrac{3}{x}$	

Part A (cont'd)

Question	Answer
17.  Is $AC \parallel DF$? Explain your answer.	
18. A boy has x 10¢ coins and y 20¢ coins in his pocket. Write an expression for the total amount of money in his pocket?	
19. Simplify (giving your answer with a positive index) $\dfrac{x^{-2m}}{x^{-m}}$	
20. Make y the subject of $x = \dfrac{1}{1+y}$	
21. Calculate the size of $P\hat{Q}R$ 	
22. Find the area of the equilateral triangle. 	

Part B

Question 1 (12 marks) - Show all working **Marks**

a) The mass of a bucket full of water is 1475g. When the bucket is half full its mass is 937g. Calculate the mass of the empty bucket. **2**

b) p, q and r are integers where $p > q$. For what values of r is: **2**

(i) $pr = qr$ (ii) $pr < qr$

c) A computer printer brochure reads "Prints at speeds of 22ppm (pages per minute) black and 15ppm colour".

(i) How long would this printer take to print a 150 page document of which 35 pages are in full colour? **4**

(ii) Is this time exact? Explain.

Question 1 (cont'd) **Marks**

d) A thunderstorm is occurring 7km from where you are standing. **4**

(i) How long does it take for the light from the lightening to reach you (use the speed of light is 3×10^5 km/second.

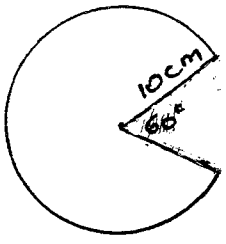
(ii) How far is your home from the thunderstorm if your mother tells you it took 15 seconds for the noise from the thunder to reach her after she saw the lightening? (Use the speed of sound is 330m/s). Give your answer in kilometres.

Question 2 (12 marks) - Show all working **Marks**

a) (i) Convert 0.37kg to mg. **2**

(ii) Convert 37900cm^2 to m^2

b) For the sector: **4**

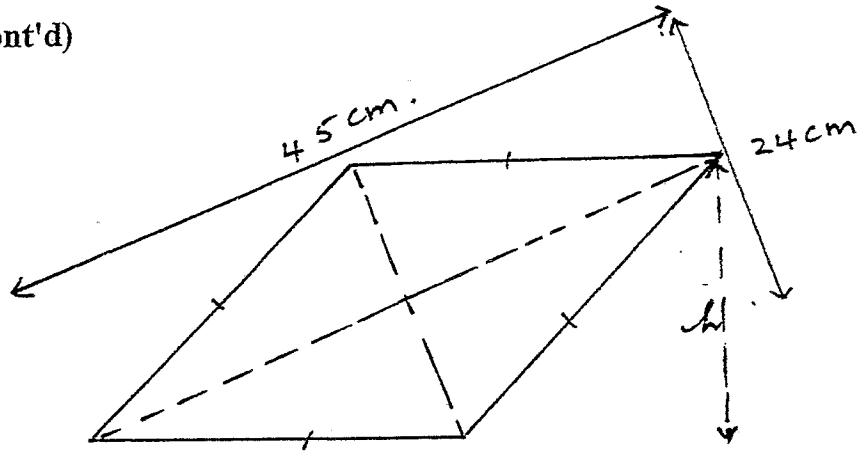


(i) Find the area.

(ii) Find the perimeter.

Question 2 (cont'd) **Marks**

c) **6**



(i) Find the area of the rhombus.

(ii) Calculate the length (l) of each side and the perimeter of the rhombus.

(iii) Find the distance (h) between the parallel sides.

Question 3 (12 marks) - Show all working **Marks**

a) Expand and simplify: **5**

(i) $(x+3)(x-5)$

(ii) $(2y-3)^2$

(iii) $x^2-(x+1)(x-1)$

b) Factorise fully **2**

(i) $7x^2y+14xy-21xy^2$

(ii) $5(a+b)-b(a+b)$

Question 3 (cont'd) **Marks**

c) Simplify (give all answers with positive indices) **5**

(i) $20a^4b^2 \div 10a^3b^3$

(ii) $\dfrac{\left(4x^2\right)^3}{8x^5}$

(iii) $\dfrac{6p^2q^{-3} \times 5p^3q^2}{\left(3p^{-2}\right)^2}$

Question 4 (12 marks) - Show all working **Marks**

a) Solve the equations: **4**

(i) $5(n-2)=3(n+4)$

(ii) $\frac{a+5}{2}-\frac{a-1}{3}=2$

b) Solve and graph the solution on the number line. **3**

$$\frac{6-2x>4}{3}$$

Question 4 (cont'd) **Marks**

c) A boy is 12 years older than his sister. In 4 years time he will be twice her age. Write an equation to represent this information and solve it to find their ages. **3**

d) Rearrange the formula to make "R" the subject: **2**

$$T = 2\sqrt{\frac{P}{R}}$$

End of Paper

Name: SOLUTIONS Class: _____

St George Girls High School

Year 9

Common Test 1

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Section A	/22
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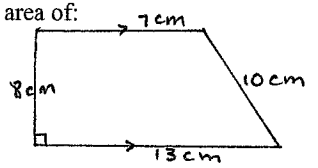
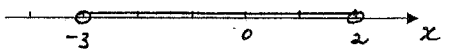
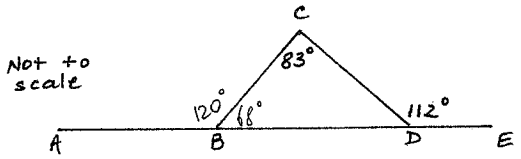
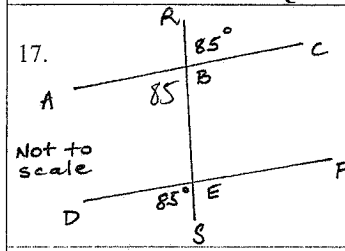
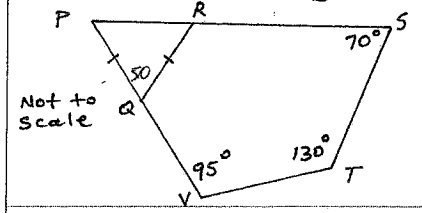
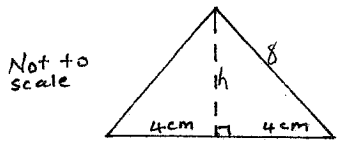
Part A
22 Questions – 1 mark each
(Answers only in the Answer Column)

Question	Answer
1. Solve $4n+10=2$	$n=-2$
2. Evaluate $8m^{\circ}$	8
3. State the number of significant figures in 0.00802 (placeholders)	3.
4. The speed limit on freeways is 110km/h. What is this in metres per second?	~~35~~ $30\frac{5}{9}$ m/s
5. Evaluate $8^{-\frac{2}{3}}$	$\frac{1}{4}$
6. Find the area of:  Not to Scale	$80cm^2$
7. If $t=-2$, evaluate $5t^2$ $(-2)^2=+4$	20
8. Write the inequality which is represented by the graph: 	$-3<x<2$

Part A (cont'd)

Question	Answer
9. Show how you would estimate $\frac{34\times\sqrt[3]{28.5}}{8.7}$. Do not calculate the answer to your estimate.	$\frac{33\times\sqrt[3]{27}}{9}$
10. Find the size of $A\hat{B}C$ 	120°
11. If $1\frac{1}{2}L$ cost \$1.56 what is the cost per litre?	\$1.04
12. Solve for x: $4^x=32$ $(2^2)^x=2^5$ $2^{2x}=2^5$ $\therefore 2x=5$	$x=\frac{5}{2}$
13. Angela measured the width of her desk as 65.0cm What could the actual width have been? $64.95\leq 65.0<65.05$	$64.95\leq 65.0<65.05$
14. Use the formula $V=\frac{ct}{2}$ to find V when $c=2.4\times10^6$ and $t=3.8\times10^{-4}$. Give your answer in scientific notation.	4.56×10^{2}
15. Find the radius of the circle whose perimeter is 15π cm. $2\pi r=15\pi$ $2r=15$	$r=7.5$cm
16. Solve $\frac{4}{x-2}=\frac{3}{x}$ $\frac{4}{x-2}\times x(x-2)=\frac{3}{x}\times x(x-2)$ $4x=3(x-2)$	$x=-6$

Part A (cont'd)

Question	Answer
17.  Is $AC\|\|DF$? Explain your answer.	corr. $\angle$s are equal. Lines must be parallel V. opp. $\angle$s equal...
18. A boy has x 10¢ coins and y 20¢ coins in his pocket. Write an expression for the total amount of money in his pocket? $(10x+20y)$ cents	$(10x+20y)$ cents
19. Simplify (giving your answer with a positive index) $\frac{x^{-2m}}{x^{-m}}$ $x^{-2m-(-m)}$ x^{-2m+m} x^{-m}	$=x^{-m}$ $=\frac{1}{x^m}$
20. Make y the subject of $x=\frac{1}{1+y}$ $x(1+y)=1$ $x+xy=1$ $xy=1-x$	$y=\frac{1-x}{x}$ $=\frac{1}{x}-1$
21. Calculate the size of $P\hat{Q}R$ 	$\angle PQR=50°$
22. Find the area of the equilateral triangle.  $8^2=h^2+4^2$ $h^2=64-16$ $=48$ $h=\sqrt{48}$	$4\sqrt{48}$ $4\sqrt{16\times3}$ $4\sqrt{16}\times\sqrt{3}$ $=16\sqrt{3}$ cm^2

Part B

Question 1 (12 marks) - Show all working **Marks**

a) The mass of a bucket full of water is 1475g. When the bucket is half full its mass is 937g. Calculate the mass of the empty bucket. **2**

$\left(\frac{1475}{937}\right) \times 2 =$ mass

$= 399g$

b) p, q and r are integers where $p > q$. For what values of r is: **2**

(i) $pr = qr$ (ii) $pr < qr$

$r = 0$ or negative

$r \leq 0$

c) A computer printer brochure reads "Prints at speeds of 22ppm (pages per minute) black and 15ppm colour".

(i) How long would this printer take to print a 150 page document of which 35 pages are in full colour? **4**

$\frac{35}{15}$ = mins colour

$\frac{115}{22}$ = mins black+white

total time $= \frac{35}{15} + \frac{115}{22} = 7$ mins 34s

(ii) Is this time exact? Explain.

rounding off

practicality

Question 1 (cont'd) **Marks**

d) A thunderstorm is occurring 7km from where you are standing. **4**

(i) How long does it take for the light from the lightening to reach you (use the speed of light is 3×10^5 km/second.

$S = \frac{D}{T}$

$ST = D$, $T = \frac{D}{S}$

$\frac{7}{3 \times 10^5} = 2.33 \times 10^{-5}$ s

(ii) How far is your home from the thunderstorm if your mother tells you it took 15 seconds for the noise from the thunder to reach her after she saw the lightening? (Use the speed of sound is 330m/s). Give your answer in kilometres.

$T = \frac{D}{S}$

$= \frac{7}{3 \times 10^5}$

$= 2.33 \times 10^{-5}$ s

$D = ST$

$= 330 \times 15$

$= 4950$m

$= 4.951$km

Question 2 (12 marks) - Show all working **Marks**

a) (i) Convert 0.37kg to mg. **2**

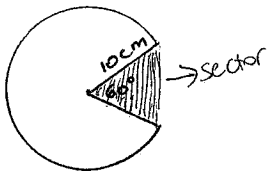
$0.37\text{kg} \xrightarrow{\times 1000\,000} \text{mg}$

$= 370000\text{mg}$

(ii) Convert 37900cm^2 to m^2

$= 3.79\text{m}^2$

b) For the sector: **4**



(i) Find the area.

$A = \frac{5}{6} \times \pi r^2$

$= 261.8\text{cm}^2$

(ii) Find the perimeter.

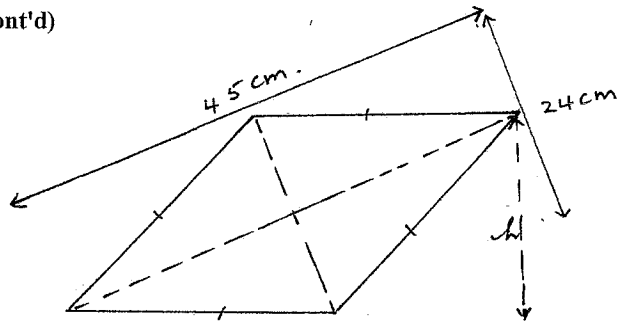
$P = 20 + \frac{5}{6} 2\pi r$

$= 20 + \frac{5}{6} 20\pi$

$\div 72.4\text{cm}$

Question 2 (cont'd) **Marks**

c) **6**



(i) Find the area of the rhombus.

$\text{area} = \frac{1}{2} \times 45 \times 24$

$= 540\text{cm}^2$

(ii) Calculate the length (l) of each side and the perimeter of the rhombus.

$l^2 = 144 + 506.25$

$= 650.25$

$l = 25.5\text{cm}$

$P = 25.5 \times 4$

$= 102\text{cm}$

(iii) Find the distance (h) between the parallel sides.

$A = 540$

$= 25.5 \times h$

$= \frac{540}{25.5}$

$\div 21.2$

Question 3 (12 marks) - Show all working

Marks

a) Expand and simplify: **5**

(i) $(x+3)(x-5)$

$x(x-5)+3(x-5)$

$x^2-5x+3x-15$

$x^2-2x-15$

(ii) $(2y-3)^2$

$(a+b)^2 = a^2+2ab+b^2$

$(2y)^2-2\times 2y\times 3+3^2$

$=4y^2-12y+9$

(iii) $x^2-(x+1)(x-1)$

$x^2-1(x^2-1)$

$=x^2-x^2+1$

$=1$

b) Factorise fully **2**

(i) $7x^2y+14xy-21xy^2$

$7xy(x+2-3y)$

$=7x^2y+14xy-21y^2$

$=7xy(x+2-3y)$

(ii) $5(a+b)-b(a+b)$

$(5-b)(a+b)$

Question 3 (cont'd)

Marks

c) Simplify (give all answers with positive indices) **5**

(i) $20a^4b^2 \div 10a^3b^3$

$\frac{20a^4b^2}{10a^3b^3}$

$=2ab^{-1}$ $=2a\times\frac{1}{b}$

$=\frac{2a}{b}$

(ii) $\frac{(4x^2)^3}{8x^5}$

$\frac{64x^6}{8x^5}$

$=8x$

(iii) $\frac{6p^2q^{-3}\times 5p^3q^2}{(3p^{-2})^2}$

$\frac{30p^5q^{-1}}{9p^{-4}}$

$=3\frac{1}{3}$

Question 4 (12 marks) - Show all working **Marks**

a) Solve the equations: **4**

(i) $5(n-2)=3(n+4)$

$5n-10=3n+12$
$2n-10=12$
$2n=22$
$n=11$

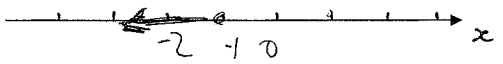
(ii) $\frac{a+5}{2}-\frac{a-1}{3}=2$

$6\left[\frac{a+5}{2}-\frac{a-1}{3}\right]=12$
$3(a+5)-2(a-1)=12$
$3a+15-2a+2=12$
$a+17=12$
$-17=-17$
$a=-5$

b) Solve and graph the solution on the number line. **3**

$\frac{6-2x>4}{3}$ | should read $\frac{6-2n}{3}>4$

$6-2x>12$
$-6 \quad -6$
$-2x>6$
$\frac{-2x}{-2}<\frac{6}{-2}$
$x<-3$



Question 4 (cont'd) **Marks**

c) A boy is 12 years older than his sister. In 4 years time he will be twice her age. Write an equation to represent this information and solve it to find their ages. **3**

Let sisters age be x
$\therefore$ boys age $x+12$

$x+16=2(x+4)$
$x+16=2x+8$
$x=8$

$\therefore$ sisters age 8
brother age 20

d) Rearrange the formula to make "R" the subject: **2**

$T=2\sqrt{\frac{P}{R}}$

$T^2=4\left(\frac{P}{R}\right)$
$RT^2=4P$
$R=\frac{4P}{T^2}$

End of Paper