

NEWINGTON COLLEGE



Mid Year Examination 2012

YEAR 8 MATHEMATICS

Time allowed: 90 minutes

NAME: _____ Teacher: _____

- Outcomes being assessed:**
1. Factorises simple algebraic expressions and uses this to simplify simple algebraic fractions.
 2. Operates with percentages.
 3. Uses algebraic techniques to solve linear equations and simple inequalities.
 4. Uses and applies Pythagoras' Theorem.
 5. Constructs, reads and interprets graphs, tables, chart and statistical information.

Directions to candidates

All questions may be attempted.

In each question, show all necessary working.

The use of hand-held non-programmable calculators is permitted.

Marks will be deducted for careless or badly arranged work.

Outcome	Mark
Algebra	/20
Percentages	/20
Equations	/30
Pythagoras' Theorem	/20
Data	/10
Total	/100

Teacher's Comment:

Student's Comment:

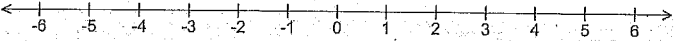
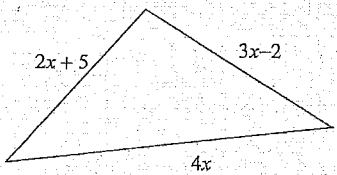
SECTION 1	ALGEBRA	20 Marks
1. Simplify these expressions:		10
(a)	$6x+x$	
(b)	$3a^2+4a^2$	
(c)	$6y-8b+2y$	
(d)	$3a \times 2b$	
(e)	$-6k \times 5k$	
(f)	$m^6 \times m^3$	
(g)	$8c^4 \times 5c^3$	
(h)	$(2f^3)^4$	
(i)	$6y^6 \div 2y^3$	
(j)	$\frac{12x^6y^2}{4x^2y}$	

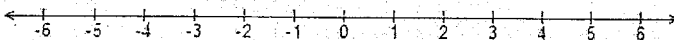
2. Factorise fully	2
(a) $4p-12$	
(b) $6x^8-9x^4+12x^2y$	
3. Simplify $\frac{4x+8}{6x+12}$	2
4. Expand and simplify $7y-4(2y-1)$	2
5. Simplify $\frac{5a}{4}-\frac{a}{3}$	2
6. Simplify completely $\frac{8x-12}{x} \div \frac{x-3}{7x^3}$	2


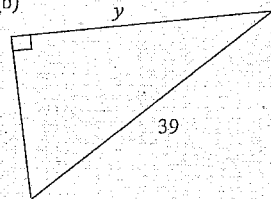
SECTION 2	PERCENTAGES	20 Marks
1.	Convert $\frac{5}{8}$ to a percentage.	2
2.	Find 12% of \$300.	1
3.	Convert 9% to a decimal.	1
4.	Convert to a fraction in simplest form:	
	(a) 36%	2
	(b) $12\frac{1}{2}\%$	1
5.	Increase 650 by 30%.	2
6.	Tom scored 65% in his Maths test. If the paper was out 80, what was his mark out of 80.	2

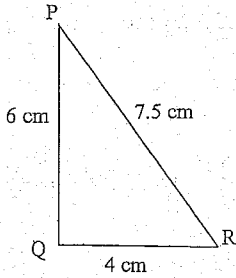
7.	Express 15 hours out of 3 days as a percentage. (Give your answer correct to 1 decimal place)	2
8.	At John's party, 12 people arrive before 7:00pm. If this was 40% of total number who attended the party, how many people attended?	2
9.	A salesperson receives a retainer of \$200 per week plus 5% for total weekly sales exceeding \$1000. How much do they earn in a week where they sell \$7530 worth of goods?	3
10.	A business normally makes a profit of 85% on the fishing rods they sell. They then have a sale "35% off the new price". What is their percentage profit now?	2

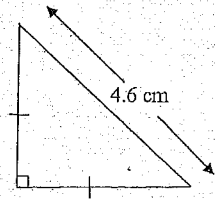
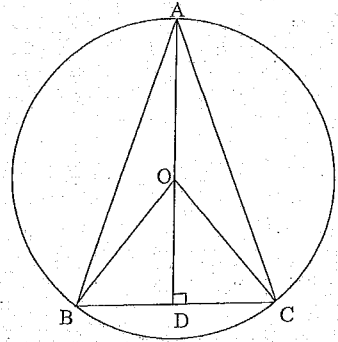
3 EQUATIONS, INEQUALITIES AND FORMULAE	30 Marks
1. Solve the following equations: (a) $f + 5 = 12$	1
(b) $2y = 15$	1
(c) $\frac{u}{3} = 6$	1
(d) $3v + 7 = -3$	2
(e) $6(3 - p) = 5$	2
(f) $\frac{3g - 5}{4} = 7$	2

2. Graph the solution of $x < 4$ on this number line. 	2
3. Find the value of S if $S = ut + \frac{1}{2}at^2$, $u = 5$, $a = 4$ and $t = 3$.	2
4. Find the value of x if the perimeter of this triangle is 96 cm. 	3
5. The sum of a number and 8 is one third the product of the number and 5. Form an equation and find the number.	3

<p>6. The sum of three consecutive even numbers is 156. By forming an equation find the value of the middle number of the consecutive numbers.</p>	3
<p>7. Solve for x: $5x - 6 \leq 8x$ and graph your solution on a number line.</p> <div style="text-align: center; margin-top: 20px;">  </div>	3
<p>8. Find the value of b if $\frac{1}{a} = \frac{1}{b} - \frac{1}{c}$, $a = 6$ and $c = 5$.</p>	3
<p>9. For what value of x does $\frac{x^2 - 7}{x} - \frac{2x + 5}{2} = 1$?</p>	2

SECTION 4 PYTHAGORAS' THEOREM		20 Marks
<p>1. Calculate the value of the pronumeral:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <p>(a)</p>  </div> <div style="text-align: center;"> <p>(b)</p>  </div> </div>	4	
<p>2. A rectangle has side lengths 7cm and 12 cm. Find the length of the diagonals correct to 1 decimal place.</p>	3	

<p>3. Billy runs due east for 600 m and walks due north for 1 km. How far is he from his starting point? Answer correct to the nearest metre.</p>	<p>3</p>
<p>4. Find the distance between the points A (2,3) and B (6,6) on a number plane where the units are in centimetres.</p>	<p>2</p>
<p>5. Show why $\angle PQR$ is not a right angle.</p> 	<p>2</p>

<p>6. Find the perimeter of the triangle below correct to 1 decimal place</p> 	<p>3</p>
<p>7. The points A, B and C all lay on the circle, O is the centre of the circle, $AB = AC$, AOD is a straight line and $\angle ADC$ is a right angle. Find the length AC if $AD = 25$ cm and $OD = 12$ cm. Answer correct to 1 decimal place.</p> 	<p>3</p>

SECTION 4 DATA REPRESENTATION		10 marks																																			
1. Classify the following data as categorical or quantitative.		2																																			
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2. From the graph below how many clocks were manufactured in April?		1																																			
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4. Using the graph below, find the cost of a 150 second Mobile phone call.		1
<p style="text-align: center;">Mobile phone charges</p>		
5. Joe's distance from home while driving in his car is shown in the graph below.		
(a) At what speed did Joe travel between 3pm and 5pm		1
(b) For how long was Joe stopped?		1

Solution

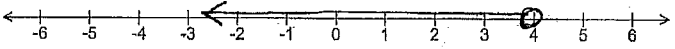
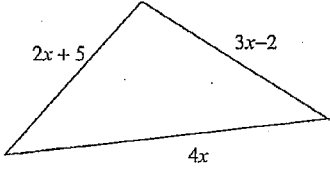
SECTION 1	ALGEBRA	20 Marks
1. Simplify these expressions:		10
(a)	$6x+x$	$7x$
(b)	$3a^2+4a^2$	$7a^2$
(c)	$6y-8b+2y$	$8y-8b$
(d)	$3a \times 2b$	$6ab$
(e)	$-6k \times 5k$	$-30k^2$
(f)	$m^6 \times m^3$	m^9
(g)	$8c^4 \times 5c^3$	$40c^7$
(h)	$(2f^3)^4$	$16f^{12}$
(i)	$6y^6 \div 2y^3$	$3y^3$
(j)	$\frac{12x^6y^2}{4x^2y}$	$3x^4y$

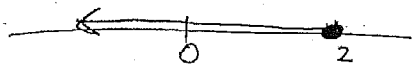
2. Factorise fully		2
(a)	$4p-12$	$4(p-3)$
(b)	$6x^3-9x^2+12x^2y$	$3x^2(2x-3+4y)$
3. Simplify	$\frac{4x+8}{6x+12} = \frac{4(\cancel{x+2})}{6(\cancel{x+2})} = \frac{2}{3}$	2
4. Expand and simplify	$7y-4(2y-1) = 7y-8y+4$ $= -y+4$	2
5. Simplify	$\frac{5a}{4} - \frac{a}{3} = \frac{15a}{12} - \frac{4a}{12} = \frac{11a}{12}$	2
6. Simplify completely	$\frac{8x-12}{x} + \frac{x-3}{7x^3} = \frac{4(\cancel{x-3})}{x} \times \frac{7\cancel{x^3}x^2}{\cancel{x^3}} = 28x^2$	2

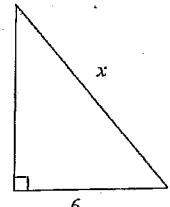
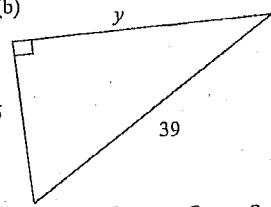
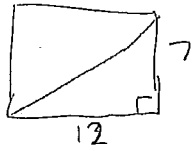
SECTION 2 PERCENTAGES		20 Marks
1. Convert $\frac{5}{8}$ to a percentage.	$\frac{5}{8} \times 100\% = 62.5\%$	2
2. Find 12% of \$300	$\frac{12}{100} \times 300 = \36	2
3. Convert 9% to a decimal	$\frac{9}{100} = 0.09$	1
4. Convert to a fraction in simplest form:		
(a) 36%	$= \frac{36}{100} = \frac{9}{25}$	1
(b) $12\frac{1}{2}\%$	$= \frac{1}{8}$	1
5. Increase 650 by 30%	$130\% \text{ of } 650$ $= 1.3 \times 650$ $= 845$	2
6. Tom scored 65% in his Maths test. If the paper was out 80, what was his mark out of 80.	$65\% \text{ of } 80$ $= \frac{65}{100} \times 80$ $= 52$	2

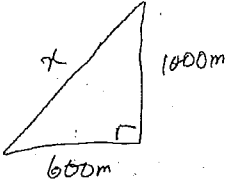
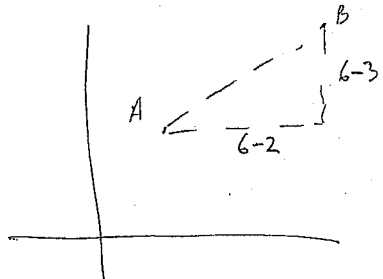
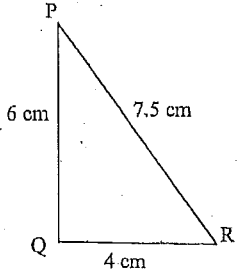
7. Express 15 hours out of 3 days as a percentage. (Give your answer correct to 1 decimal place)	$\frac{15}{72} \times \frac{100}{1}\% = 20.8\%$	2
8. At John's party, 12 people arrive before 7:00pm. If this was 40% of total number who attended the party, how many people attended?	$40\% \text{ is } 12$ $10\% \text{ is } 3$ $100\% \text{ is } 30$ 30 people	2
9. A salesperson receives a retainer of \$200 per week plus 5% for total weekly sales exceeding \$1000. How much do they earn in a week where they sell \$7530 worth of good?	$\text{Income} = \$200 + 0.05 \times (7530 - 1000)$ $= \$526.50$	3
10. A business normally makes a profit of 85% on the fishing rods they sell. What is their percentage profit when they have a 35% off sale?	Let the cost price be x Selling price is $\$1.85x$ Sale price is $65\% \text{ of } \$1.85x$ $= \$1.2025x$ $\therefore \text{profit at } 35\% \text{ off sale is } 20.25\%$	2

3 EQUATIONS, INEQUALITIES AND FORMULAE	30 Marks
1. Solve the following equations:	1
(a) $f+5=12$ $f=7$	1
(b) $2y=15$ $y=7.5$	1
(c) $\frac{u}{3}=6$ $u=18$	1
(d) $3v+7=-3$ $3v=-10$ $v=-\frac{10}{3}$ $=-3\frac{1}{3}$	2
(e) $6(3-p)=5$ $18-6p=5$ $-6p=-13$ $p=\frac{13}{6}$ $=2\frac{1}{6}$	2
(f) $\frac{3g-5}{4}=7$ $3g-5=28$ $3g=33$ $g=11$	2

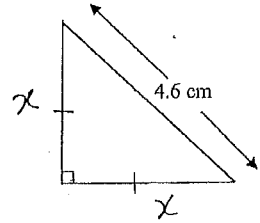
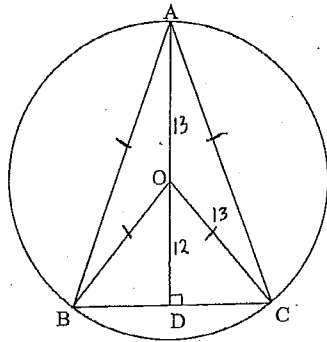
2. Graph the solution of $x < 4$ on this number line:	2
	2
3. Find the value of S if $S=ut+\frac{1}{2}at^2$, $u=5$, $a=4$ and $t=3$.	3
<div style="text-align: center;">  </div> <p>Find the value of x if the perimeter of this triangle is 96 cm.</p> $2x+5+3x-2+4x=96$ $9x+3=96$ $9x=93$ $x=10\frac{1}{3}$	3
5. The sum of a number and 8 is one third the product of the number and 5. Form an equation and find the number.	3
$x+8=\frac{1}{3}(x \times 5)$ $3x+24=5x$ $24=2x$ $x=12$	

<p>6. ^{sum} The of three consecutive even numbers is 156. By forming an equation find the value of the middle number of the consecutive numbers.</p> $x + x + 2 + x + 4 = 156$ $3x + 6 = 156$ $3x = 150$ $x = 50$	3
<p>7. Solve for x: $5x - 6 \leq 2x$ and graph your solution on a number line.</p> $5x - 6 \leq 2x$ $3x - 6 \leq 0$ $3x \leq 6$ $x \leq 2$ 	3
<p>8. Find the value of b if $\frac{1}{a} = \frac{1}{b} - \frac{1}{c}$, $a = 6$ and $c = 5$.</p> $\frac{1}{6} = \frac{1}{b} - \frac{1}{5}$ $\frac{1}{b} = \frac{1}{6} + \frac{1}{5} = \frac{5}{30} + \frac{6}{30} = \frac{11}{30}$ $\frac{1}{b} = \frac{11}{30}$ $b = \frac{30}{11} = 2 \frac{8}{11}$	2
<p>9. For what value of x does $\frac{x^2 - 7}{x} - \frac{2x + 5}{x} = 1$.</p> $\frac{x^2 - 7}{x} - \frac{2x + 5}{x} = 1$ $2(x^2 - 7) - x(2x + 5) = 2x$ $2x^2 - 14 - 2x^2 - 5x = 2x$ $-14 - 5x = 2x$ $-14 = 7x \quad x = -2$	3

SECTION 4 PYTHAGORAS' THEOREM		20 Marks
<p>1. Calculate the value of the pronumeral:</p> <div style="display: flex; justify-content: space-around;"> <div> <p>(a)</p>  </div> <div> <p>(b)</p>  </div> </div> $x^2 = 8^2 + 6^2$ $= 64 + 36$ $= 100$ $x = 10$ <div style="display: flex; justify-content: space-around; margin-top: 20px;"> $39^2 = 15^2 + y^2$ $y^2 = 39^2 - 15^2$ $= 1296$ $y = 36$ </div>	4	
<p>2. A rectangle has side lengths 7cm and 12 cm. Find the length of the diagonals correct to 1 decimal place.</p>  $x^2 = 12^2 + 7^2$ $= 193$ $= 13.9$	3	

<p>3. Billy runs east for 600 m and walks north for 1 km. How far is he from his starting point correct to the nearest metre.</p>  $x^2 = 600^2 + 1000^2$ $= 1360000$ $x = 1166.2 \text{ m}$	3
<p>4. Find the distance between the points A (2,3) and B (6,6) on a number plane where the units are in centimetres.</p>  $x^2 = 3^2 + 4^2$ $= 9 + 16$ $= 25$ $x = 5$	2
<p>5. Show why $\angle PQR$ is not a right angle.</p>  $PR^2 = 7.5^2 = 56.25$ $PQ^2 + QR^2 = 6^2 + 4^2$ $= 24 + 16$ $= 40$ <p>$PR^2 \neq PQ^2 + QR^2$ and PR is the longest side $\therefore \triangle PQR$ is not a right angled triangle</p>	2

$\therefore \angle PQR$ is not a right angle.

<p>6. Find the perimeter of the triangle below correct to 1 decimal place</p>  $x^2 + x^2 = 4.6^2$ $2x^2 = 21.16$ $x^2 = 10.58$ $x = 3.3 \text{ cm}$	3
<p>7. The points A, B and C all lay on the circle, O is the centre of the circle, $AB = AC$, AOD is a straight line and $\angle ADC$ is a right angle. Find the length AC if $AD = 25$ cm and $OD = 12$ cm.</p>  $OC^2 = 13^2 - 12^2$ $= 169 - 144$ $= 25$ $OC = 5$ $AC^2 = 25^2 + 5^2$ $= 650$ $AC = \sqrt{650}$ $\approx 25.5 \text{ cm}$	3

SECTION 4 DATA REPRESENTATION	10 marks																																			
<p>1. Classify the following data as categorical or quantitative.</p> <p>a) students height <i>quantitative</i></p> <p>b) colour of cars <i>categorical</i></p>	2																																			
<p>2. From the graph below how many clocks were manufactured in April?</p> <div style="text-align: center;"> <p>CHRIT's clocks</p> <table border="1" style="margin: auto;"> <tr> <td>Jan.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Feb.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mar.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Apr.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>May</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p style="margin-top: 10px;">$2 \frac{1}{4} \times 200 = 450$</p> <p>Key: = 200 clocks manufactured</p> </div>	Jan.							Feb.							Mar.							Apr.							May							1
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<p>3. In a survey the following results were obtained.</p> <table border="1" style="margin: auto; width: 50%;"> <thead> <tr> <th>Colour</th> <th>white</th> <th>Silver</th> <th>Black</th> <th>Red</th> <th>yellow</th> </tr> </thead> <tbody> <tr> <td>Number</td> <td>24</td> <td>36</td> <td>21</td> <td>12</td> <td>3</td> </tr> </tbody> </table> <p>(a) If you were constructing a 12 cm long divider bar graph, how long would you need to make the section for yellow to the nearest millimetre?</p> <p style="margin-left: 40px;">$\frac{3}{96} \times 12 = 0.375 \text{ cm}$ $= 3.8 \text{ mm (nearest mm)}$</p> <p>(b) If you constructing a Sector graph, how any degrees for you need to make the sector of silver?</p> <p style="margin-left: 40px;">$\frac{36}{96} \times 360 = 135^\circ$</p>	Colour	white	Silver	Black	Red	yellow	Number	24	36	21	12	3	2																							
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Number	24	36	21	12	3																															

<p>4. Using the graph below, find the cost of a 150 second Mobile phone call.</p> <div style="text-align: center;"> <p>Mobile phone charges</p> <p style="margin-top: 10px;">$150 \text{ sec} = 2 \frac{1}{2} \text{ min}$</p> <p style="margin-left: 100px;">$\\$0.90$</p> </div>	1
<p>5. Joe's distance from home while driving in his car is shown in the graph below.</p> <div style="text-align: center;"> </div> <p>(a) At what speed did Joe travel between 3pm and 5pm</p> <p style="margin-left: 40px;">$\frac{120}{2} = 60 \text{ km/h}$</p> <p>(b) For how long was Joe stopped?</p> <p style="margin-left: 40px;">2 hours.</p>	1

