SYDNEY TECHNICAL HIGH SCHOOL

Year 9
Yearly Exam
2011

Name: _____ Teacher: _____

Mathematics

Time allowed — 70 minutes

Instructions

- Approved calculators may be used.
- All necessary working must be shown. Marks may not be awarded for careless or badly arranged work.
- Marks awarded are shown on each question.
- Attempt all questions.

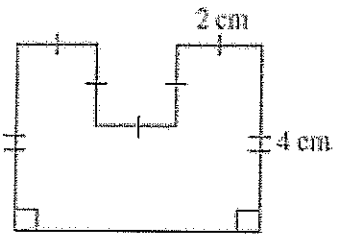
Question	Part A Measurement /15	Part B Eqns,etc /15	Part C Consumer Maths /15	Part D Co-ord Geom /~~16~~ 14	Part E Factorising Algebraic Frns /15.	Total /~~76~~ 74
Marks						

Part A Measurement

15 marks

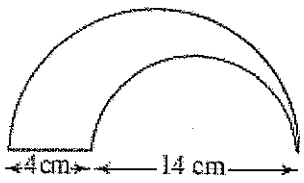
1 Find, correct to 1 decimal place where appropriate, the perimeter of the following:

a.



(1 mark)

b.

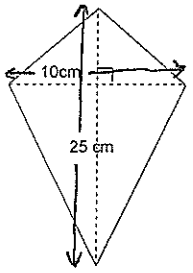


(semicircles)

(2 mark)

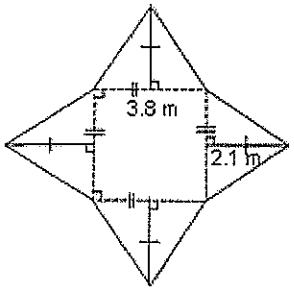
2 Find the area of the following correct to 1 decimal place :

a.



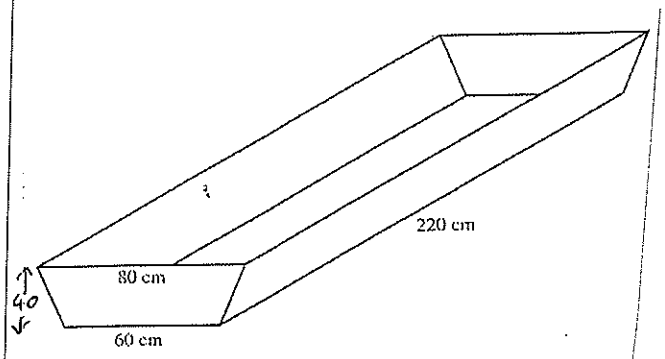
(1 mark)

b.



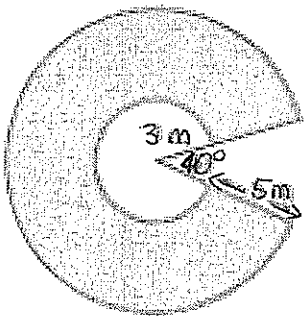
(2 marks)

3 A feeding trough is constructed with the dimensions shown in the figure below.
Determine the number of litres of water it can hold when the depth of water is 40 cm.



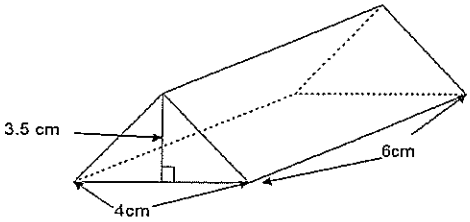
(3 marks)

4 Find the area shaded, correct to 1 decimal place, of



(3 marks)

5 Find the surface area of:



(3 marks)

Part B Equations, Inequalities and Formula

15 marks

1. $x(2x-3)-5(x+1)=2x(x-5)$

(2 marks)

2. $\frac{3x+1}{2}-\frac{1-2x}{5}=\frac{3x-2}{4}$

(3 marks)

3. $\frac{2x+1}{7}=\frac{3-2x}{5}$

(2 marks)

4. Solve and graph the solution to:

$3x-7 \leq 5x-11$

(3 marks)

5. $\frac{x-3}{2}-\frac{5+2x}{3}>\frac{2x+1}{4}$

(2 marks)

6. Julia drives to school and travels an average of 50 km/h but if she could drive at an average speed of 60 km/h she would cut 3 minutes off her trip. How far does she travel each day?

(2 marks)

7. The distance fallen (d m) by a stone down a well after t seconds is given by the formula $d = \frac{1}{2} gt^2$ where $g = 9.8$

   a. Find the distance fallen after 3 seconds

(1 mark)

   b. Rearrange the formula to make t the subject.

(1 mark)

Part C Consumer Arithmetic **15 marks**

1. Convert an annual income of $55,380 into a monthly salary.

(1mark)

2. Calculate Julia's total holiday pay including leave loading at 17.5% for 4 weeks if she is paid $11.50 per hour for a 40 hour week.

(1 mark)

3. Mark works as a casual at a local petrol station. He is paid $9.60 per hour Monday to Friday and $14.40 per hour for weekend work. During one week he worked from 5.00pm to 8.00pm on Wednesday, Thursday and Friday and 9.00am to 4.30pm on Sunday. How much did he earn?

(2mark)

4. A cricket bat sells for $365 (GST inclusive) What GST is paid? (To nearest cent)

(1 mark)

5. Helen works in a factory attaching studs. She is paid on a piece work basis at a rate of 76 cents for each piece up to 100 items per day and 92 cents for each piece in excess of 100 items per day. Calculate her weekly wage if her production is as follows:

Monday: 86, Tuesday: 102, Wednesday: 114, Thursday: 98
Friday: 127

(2 mark)

6. Dave buys a car at $24,650. The terms are 20% deposit and $141.50 per week for three years. Calculate:

a. The amount borrowed (if he already has the deposit)

(1 mark)

b. Total amount of the repayments

(1 mark)

c. Total interest paid

(1 mark)

d. Total cost of the car

(1 mark)

ANNUAL TAX PAYABLE

ANNUAL TAX RATES (2010/2011)

Taxable Income Tax

$1 - $6000	nil
$6001 - $30 000	15 cents for each $ over $6000
$30 001 - $75 000	$3600 + 30 cents for each $ over $30 000
$75 001 - $150 000	$17 100 + 40 cents for each $ over $75 000
$150 001 and over	$47 100 + 45 cents for each $ over $150 000

Rebates reduce tax

2010/2011 MEDICARE LEVY TABLE

Taxable Income	*Medicare levy*
$1 to $16 740 nil	nil
$16 741 to $19 694	10 cents for each dollar above $16 740
$19 695 and above	1.5% of the taxable income

7. Calculate the tax payable and the medicare levy on a taxable income of $48 290

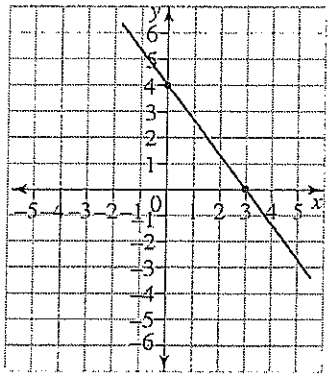
(2 marks)

8. Calculate the tax refund or tax bill if the taxable income is $35 750, and the tax instalments paid are $3 809.30

(2 marks)

Part D Co-ordinate Geometry ~~(16 marks)~~

1. What is the y intercept and gradient of the following diagram?



(2 marks)

2. What is the gradient and y intercept of a line with the equation $y = -7x + 3$.

(2 marks)

3. What is the *x*-intercept of the line with an equation $y = -3x - 12$?

(1 marks)

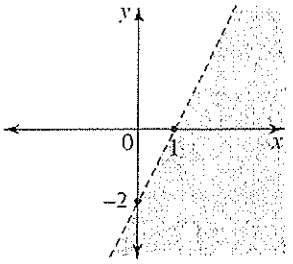
4. The equation of a straight line with an *x*-intercept of –3 and a *y*-intercept of –3 would be?

(2 marks)

5. The gradient of the line parallel to $3x + 11y - 2 = 0$ is:

(1 marks)

6. Write the inequality which describes the region below:



(2 marks)

~~7. R (k, 5) and S (1, 3) are $\sqrt{8}$ units apart. Find k.~~

~~(2 marks)~~

8. If M is the midpoint of AB, find the coordinates of B, given A(5, 3) and M(3, 2).

(2 marks)

9. Determine the equation for a line whose gradient is –5 and which passes through the point (–5, 12).

(2 marks)

Part E Factorising, Expressions and Algebraic Fractions (15 marks)

Fully factorise the following and simplify where possible:

1. $6a + 2b + 3xa + xb$

(1)

2. $x^2 - 3x - 28$

(1)

3. $3x^2 + 9x + 6$

(2)

4. $1 - 4x^2$

(2)

5. $(x + 2)^2 - (y + 3)^2$

(2)

6. $4q^2 - 4$

(2)

~~Simplify the following.~~

7. $\frac{x^2 + xy}{2x}$

(1)

8. $\frac{16 - x^2}{x^2 - x - 12}$

(2)

9. $3(q - 2) + 6aq - 12a$

(2)

SYDNEY TECHNICAL HIGH SCHOOL

Year 9
Yearly Exam
2011

Name: _____ Teacher: _____

Mathematics

Time allowed — 70 minutes

Instructions

- Approved calculators may be used.
- All necessary working must be shown. Marks may not be awarded for careless or badly arranged work.
- Marks awarded are shown on each question.
- Attempt all questions.

Question	Part A Measurement /15	Part B Eqns,etc /15	Part C Consumer Maths /15	Part D Co-ord Geom /~~16~~ 14	Part E Factorising Algebraic Frns /15.	Total /~~76~~ 74
Marks						

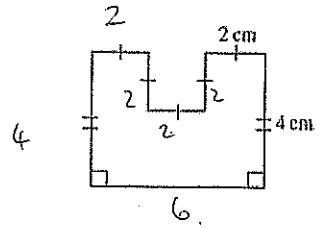
10

Part A Measurement

15 marks

1 Find, correct to 1 decimal place where appropriate, the perimeter of the following:

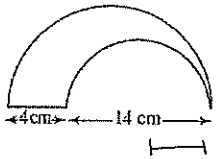
a.



$P = 24$ cm.

(1 mark)

b.



(semicircles)

$P = \pi R + \pi r + 4$

$= \pi 9 + \pi 7 + 4$

$= 16\pi + 4$

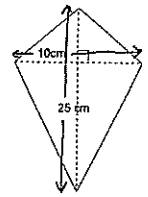
$= 54.265\ldots$

$= 54.3$ cm.

(2 mark)

2 Find the area of the following correct to 1 decimal place :

a.

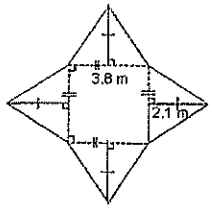


$A = \frac{10 \times 25}{2}$

$= 125$ cm^2.

(1 mark)

b.



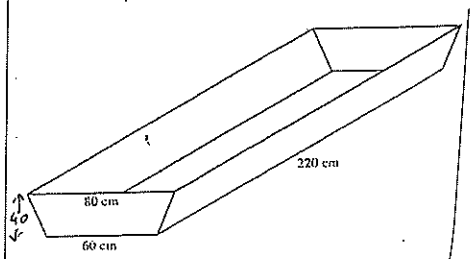
$A = (3.8)^2 + 2(2.1)(3.8)$

$= 30.4$ m^2.

(2 marks)

$C = 2\pi R$.

3 A feeding trough is constructed with the dimensions shown in the figure below.
Determine the number of litres of water it can hold when the depth of water is 40 cm.



$\frac{(80+60)40}{2} \times 220$ cm.

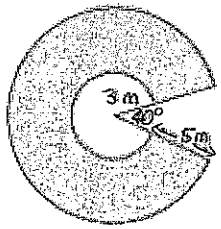
$V = 616{,}000$ cm^3

$= 616{,}000$ mL.

$= 616$ L

(3 marks)

4 Find the area shaded, correct to 1 decimal place, of



$A = \pi r^2$

$= \frac{8}{9} \times \pi \times 8^2$

$= \frac{512}{9}\pi$

$A = \pi r^2 \times \frac{8}{9}$

$= 9\pi \times \frac{8}{9}$

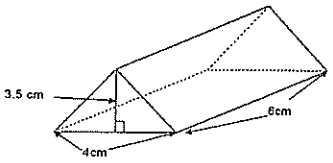
$= 8\pi$

$A_{Tot} = 48\frac{8}{9}\pi$ m^2.

$= 153.58\ldots$

(3 marks)

5 Find the surface area of:



$3.5^2 + 2^2 = x^2$

$x = \sqrt{16.25}$

$SA = \frac{b \times h}{2} \times 2 + \sqrt{16.25} \times 6 \times 3$

$= 4 \times 3.5 + 18\sqrt{16.25}$

$= 86.5603\ldots$

$= 86.6$ cm^2.

(3 marks)

Part B Equations, Inequalities and Formula — 15 marks

1. $x(2x-3) - 5(x+1) = 2x(x-5)$

$2x^2 - 3x - 5x - 5 = 2x^2 - 10x$

$2x - 5 = 0$.

$2x = 5$

$x = 5/2$.

(2 marks)

2. $\frac{3x+1}{2} - \frac{1-2x}{5} = \frac{3x-2}{4}$ (10, 20, 20)

$10(3x+1) - 4(1-2x) = 5(3x-2)$

$30x + 10 - 4 + 8x = 15x - 10$

$38x + 6 = 15x - 10$

$23x = -16$

$x = -16/23$

(3 marks)

3. $\frac{2x+1}{7} = \frac{3-2x}{5}$

$5(2x+1) = 7(3-2x)$

$10x + 5 = 21 - 14x$

$24x = 16$

$x = 2/3$

(2 marks)

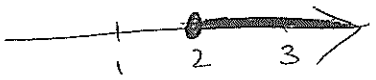
4. Solve and graph the solution to:
$3x - 7 \leq 5x - 11$

$3x - 7 \leq 5x - 11$

$-2x \leq -4$

$2x \geq 4$

$x \geq 2$.



(3 marks)

5. $\frac{x-3}{2} - \frac{5+2x}{3} > \frac{2x+1}{4}$ (×4, ×3)

$6x - 18 - (20 + 8x) > 6x + 3$

$6x - 18 - 20 - 8x > 6x + 3$

$-2x - 38 > 6x + 3$

$-8x > 41$

$8x < -41$

$x < -\frac{41}{8}$

(2 marks)

6. Julia drives to school and travels an average of 50 km/h but if she could drive at an average speed of 60 km/h she would cut 3 minutes off her trip. How far does she travel each day?

$v = \frac{d}{t}$

$50 = \frac{d}{t}$

$10 = \frac{d}{t-3}$

$50t = d$

$60(t-3) = d.$

$50t = 60(t-3)$

$50t = 60t - 180$

$10t = 180$

$t = 18$ mins

$50 = \frac{d}{18/60}$

$d = 15$ km.

$60 = \frac{d}{15/60}$

$d = 15$ km. (2 marks)

7. The distance fallen (d m) by a stone down a well after t seconds is given by the formula $d = \frac{1}{2}gt^2$ where $g = 9.8$

a. Find the distance fallen after 3 seconds

$d = \frac{1}{2} \times 9.8 \times 9$

$= 44.1$ m.

(1 mark)

b. Rearrange the formula to make t the subject.

$d = \frac{1}{2}gt^2$

$2d = gt^2$

$t = \pm\sqrt{\frac{2d}{g}}$.

(1 mark)

Part C Consumer Arithmetic — 15 marks

1. Convert an annual income of $55,380 into a monthly salary.

$4,615

(1mark)

2. Calculate Julia's total holiday pay including leave loading at 17.5% for 4 weeks if she is paid $11.50 per hour for a 40 hour week.

4wks = $11.50 \times 40 \times 4 + 17.5\%$

$= 1840 \times 1.175$

$= \$2,162$ — (1 mark)

3. Mark works as a casual at a local petrol station. He is paid $9.60 per hour Monday to Friday and $14.40 per hour for weekend work. During one week he worked from 5.00pm to 8.00pm on Wednesday, Thursday and Friday and 9.00am to 4.30pm on Sunday. How much did he earn?

Wed, Thurs + Fri = 3×9.60

Sund $= 14.40 \times 7.5$

Total = $136.80

(2mark)

4. A cricket bat sells for $365 (GST inclusive) What GST is paid? (To nearest cent)

SP = $365 —

GST = $33.18

(1 mark)

5. Helen works in a factory attaching studs. She is paid on a piece work basis at a rate of 76 cents for each piece up to 100 items per day and 92 cents for each piece in excess of 100 items per day. Calculate her weekly wage if her production is as follows:

Monday: 86, Tuesday: 102, Wednesday: 114, Thursday: 98, Friday: 127

76c + 92c.

Mon $= 86 \times .76$ 63.36

Tues $= 100 \times .76 + 2 \times .92$ 77.84

Wed $= 100 \times .76 + 14 \times .92$ 88.88

Thurs $= 98 \times .76$ 74.48

Fri $= 100 \times .76 + 27 \times .92$ 100.84

$405.40

(2 mark)

6. Dave buys a car at $24,650. The terms are 20% deposit and $141.50 per week for three years. Calculate:

a. The amount borrowed (if he already has the deposit)

$19,720 (1 mark)

b. Total amount of the repayments

141.50 × 156 = $22,074 (1 mark)

c. Total interest paid

$2,354 (1 mark)

d. Total cost of the car

= $22,074 + $4930

= $27,004 (1 mark)

ANNUAL TAX PAYABLE

ANNUAL TAX RATES (2010/2011)

Taxable Income Tax

$1 - $6000	nil
$6001 - $30 000	15 cents for each $ over $6000
$30 001 - $75 000	$3600 + 30 cents for each $ over $30 000
$75 001 - $150 000	$17 100 + 40 cents for each $ over $75 000
$150 001 and over	$47 100 + 45 cents for each $ over $150 000

Rebates reduce tax

2010/2011 MEDICARE LEVY TABLE

Taxable Income	*Medicare levy*
$1 to $16 740 nil	nil
$16 741 to $19 694	10 cents for each dollar above $16 740
$19 695 and above	1.5% of the taxable income

7. Calculate the tax payable and the medicare levy on a taxable income of $48 290

Tax = $9087

M/care = 724.35

Total = $9811.35 (2 marks)

∴ Calculate the tax refund or tax bill if the taxable income is $35 750, and the tax instalments paid are $3 809.30

Tax ~~true~~ = $5325 —

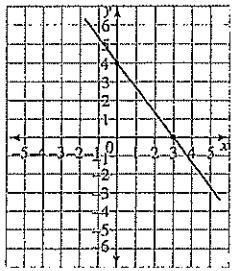
M/Care = 536.25

$5861.25

Payable = $2,051.95 (2 marks)

Part D Co-ordinate Geometry ~~(16 marks)~~

1. What is the y intercept and gradient of the following diagram?



y int = 4 $m = -\frac{4}{3}$

(2 marks)

2. What is the gradient and y intercept of a line with the equation $y = -7x + 3$.

$m = -7$ y int = 3.

(2 marks)

3. What is the *x*-intercept of the line with an equation $y = -3x - 12$?

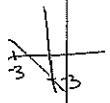
$y = 0$.

$-3x = 12$

$x = -4$

(1 marks)

4. The equation of a straight line with an *x*-intercept of –3 and a *y*-intercept of –3 would be?



$y = -x - 3$.

(2 marks)

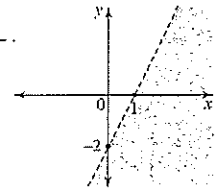
5. The gradient of the line parallel to $3x + 11y - 2 = 0$ is:

$11y = -3x + 2$.

$y = \frac{-3}{11}x + \frac{2}{11}$

$m = -3/11$ (1 marks)

6. Write the inequality which describes the region below:



$y = 2x - 2$.

$y > 2x - 2$. (2 marks)

~~7. R (k, 5) and S (1, 3) are $\sqrt{8}$ units apart. Find k.~~ ~~(2 marks)~~

8. If M is the midpoint of AB, find the coordinates of B, given A(5, 3) and M(3, 2). B(x, y)

$3 = \frac{5+x}{2}$ $2 = \frac{3+y}{2}$

$6 = 5 + x$ $4 = 3 + y$

$x = 1$ $y = 1$

(1, 1) (2 marks)

9. Determine the equation for a line whose gradient is –5 and which passes through the point (–5, 12).

$y - 12 = -5(x + 5)$

$y - 12 = -5x - 25$

$y = -5x - 13$ (2 marks)

Part E Factorising, Expressions and Algebraic Fractions **(15 marks)**

Fully factorise the following and simplify where possible:

1. $6a + 2b + 3xa + xb$

$3a(2+x) + b(2+x)$

$= (3a+b)(2+x)$ (1)

2. $x^2 - 3x - 28$

$(x-7)(x+4)$ (1)

3. $3x^2 + 9x + 6$

$3(x^2+3x+2)$

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

4. $1 - 4x^2$ $= 1^2 - (2x)^2$

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

5. $(x+2)^2 - (y+3)^2$

$[(x+2)-(y+3)][(x+2)+(y+3)]$

$(x-y-1)(x+y+5)$ (2)

6. $4q^2 - 4$ $= (2q)^2 - 2.$

$(2q-2)(2q+2)$ (2)

~~Simplify the following:~~

7. $\frac{x^2+xy}{2x} = \frac{x(x+y)}{2x}$

$= \frac{(x+y)}{2}.$ (1)

8. $\frac{16-x^2}{x^2-x-12} = \frac{(4-x)(4+x)}{(x-4)(x+3)}$

$= \frac{-1(x-4)(4+x)}{(x-4)(x+3)}$

$= \frac{(-4-x)}{(x+3)}$ (2)

9. $3(q-2) + 6aq - 12a$

~~$3q - 6 + 6aq - 12a$~~.

$3(q-2) + 6a(q-2)$ (2)

$(3+6a)(q-2)$