DO NOT OPEN THIS EXAMINATION PAPER UNTIL YOU ARE TOLD BY THE SUPERVISOR TO BEGIN

Labrador School Board

Mathematics 1201

Final Examination

June 2012

ANSWER KEY

Total Value: 100 marks Time: 3 Hours

GENERAL INSTRUCTIONS

1. Candidates are required to do all items.

2. The examination has a total of 23 pages consisting of the following parts:

Part I:	40 Multiple Choice Items	Value: 40%
Part II:	17 Constructed Response Questions	Value: 60%

3. **Page 22 is a formulae sheet** to be used for the exam. This page may be removed.

4. Part I should be completed on the answer sheet provided on **Page 23** of the exam. This page may be removed.

5. Answers to the constructed response questions for part II are to be placed in this paper in the spaces provided.

6. For PART II items, candidates are reminded to show ALL necessary steps and calculations. Partial credit may be awarded for logical work even though you might not arrive at the correct solution. Correct answers without appropriate calculations will not merit full marks.

7. A self powered calculator may be used for calculations and to obtain special values. Graphing calculators are to be reset before the examination begins.

REGULATIONS FOR CANDIDATES

Candidates are expected to be thoroughly familiar with all regulations pertaining to their conduct during examinations. Candidates must comply with all requirements governing the following matters.

- Materials required
- Leaving the room
- Materials not permitted
- Models of calculators permitted
- Use of pen or pencil
- Use of unauthorized means and penalties
- Completion of required information
- Communication during the exam

PART I
Total Value: 40%

Item	Level	Outcome(s)	Answer
1.	I	M1.1	A
2.	I	M3.2	B
3.	II	M3.2	C
4.	II	M2.2	C
5.	II	M3.6	D
6.	II	M3.8	D
7.	I	M4.1, M4.2	C
8.	I	M4.1, M4.2, M4.3	A
9.	II	M4.4, M4.5	C
10.	II	M4.5	C
11.	I	AN1.1, AN1.3	A
12.	II	AN1.6, AN1.7	B
13.	I	AN2.2	D
14.	I	AN3.4, AN3.5	C
15.	I	AN3.1, AN3.2	C
16.	II	AN3.1, AN3.2, AN3.4, AN3.5	D
17.	II	AN3.4, AN3.5	C
18.	II	AN3.4, AN3.5	D
19.	I	AN4.2	A
20.	I	AN5.3, AN5.4, AN5.5	C
21.	I	AN4.3, AN4.4, AN5.2, AN5.4	A
22.	I	AN4.4	B
23.	I	AN5.2, AN5.4, AN5.7	D
24.	II	AN4.4	B
25.	II	AN4.4	A
26.	II	AN5.2, AN5.3, AN5.4	C
27.	I	RF2.3	B
28.	I	RF4.2	A
29.	II	RF8.3	C
30.	II	RF5.6	B
31.	I	RF4.5	A
32.	II	RF3.1, RF6.4, RF6.5, RF7.1	B
33.	II	RF3.1, RF3.9	A
34.	I	RF7.3	C
35.	II	RF6.5	C
36.	I	RF3.3, RF6.4, RF7.1	C
37.	II	RF9.1, RF9.2	A
38.	II	RF9.3, RF9.5, RF9.6	C
39.	I	RF6.5, RF6.6, RF9.8	B
40.	I	RF9.3, RF9.4	D

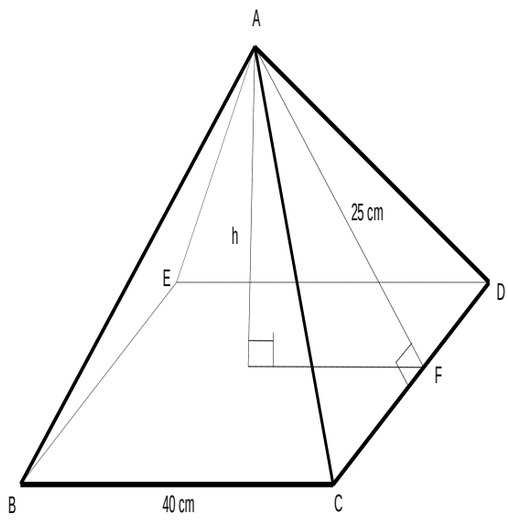
PART II
Total Value: 60%

value

4 41. The right square pyramid is such that $BC = 40\,\text{cm}$ and $AF = 25\,\text{cm}$. Find the volume of the right square pyramid to the nearest cubic centimeter.

Find perpendicular height:

$$\left.\begin{aligned} h^2 + 20^2 &= 25^2 \\ h^2 + 400 &= 625 \\ h^2 &= 625 - 400 \\ h^2 &= 225 \\ h &= 15 \end{aligned}\right\} \; 2\,marks$$



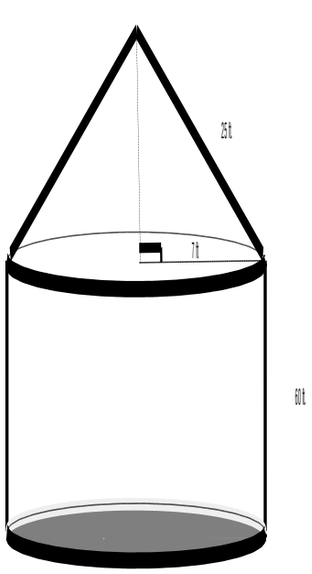
Find Volume:

$$\left.\begin{aligned} V &= \frac{1}{3}Bh \\ V &= \frac{1}{3}\times 40\times 40\times 15 \\ V &= 8000\,cm^3 \end{aligned}\right\} \; 2\,marks$$

4 42. A farmer wishes to paint the exterior of his grain storage facility with dimensions as shown. If a can of paint covers 460 ft^2, how many cans of paint will the farmer need to purchase? (Note: the bottom of the storage facility is not to be painted.)

Find Surface Area:

$$\left.\begin{aligned} S.A. &= lateral\,cone + lateral\,cylinder \\ S.A. &= \pi rs + 2\pi rh \\ S.A. &= \pi(7)(25) + 2\pi(7)(60) \\ S.A. &\doteq 549.9 + 2638.9 \\ S.A. &\doteq 3188.7\,ft^2 \end{aligned}\right\} \; 3\,marks$$



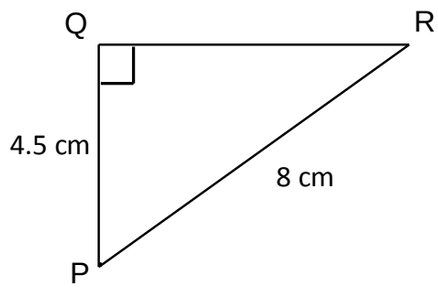
Determine number of cans:

$$\left.\begin{aligned} &= 3188.7 \div 460 \\ &\doteq 6.9 \\ &= 7\,cans\ need\ to\ be\ purchased. \end{aligned}\right\} \; 1\,mark$$

4 43. Solve triangle $\triangle$ PQR .

Find QR or $\angle Q$ first.

Find QR:



$$\left.\begin{array}{l} a^2+b^2=c^2 \\ 4.5^2+(QR)^2=8^2 \\ 20.25+(QR)^2=64 \\ (QR)^2=64-20.25 \\ (QR)^2=43.75 \\ QR=\sqrt{43.75}\doteq 6.6 \end{array}\right\} 1.5\,marks$$

Find $\angle P$:

$$\left.\begin{array}{l} \cos\angle P=\dfrac{a}{h}=\dfrac{4.5}{8} \\ \angle P=\cos^{-1}\left(\dfrac{4.5}{8}\right) \\ \angle P\doteq 56°\ or\ 55.8° \end{array}\right\} 1.5\,marks$$

Find $\angle R$:

$$\left.\begin{array}{l} \angle R\doteq 90°-56° \\ \angle R\doteq 34° \\ \\ \angle R\doteq 90°-55.8° \\ \angle R\doteq 34.2° \end{array}\right\} 1\,mark$$

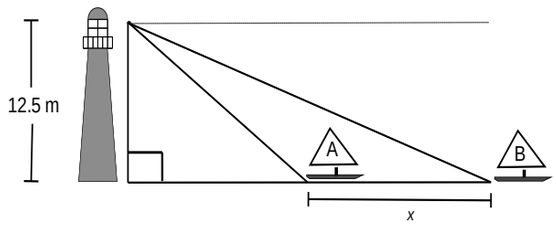
Measurements (assuming $\angle R=34°$) are:

$\angle P=56°$	$side\,p=6.6\,cm$
$\angle Q=90°$	$side\,q=8\,cm$
$\angle R=34°$	$side\,r=4.5\,cm$

4 44. A lighthouse keeper spots two sailboats in distress. Sailboat A is observed at an angle of depression of $21°$ and sailboat B at an angle of depression of $8°$. If the lighthouse keeper is 12.5 m above the ground, what is the distance (x) between the two sailboats?

Find Distance from lighthouse to sailboat A:

$$\left.\begin{array}{l}\tan 21° = \dfrac{12.5}{y} \\ y = \dfrac{12.5}{\tan 21°} \\ y = 32.6\end{array}\right\rangle\ 1.5\,marks$$



Find Distance from lighthouse to sailboat B:

$$\left.\begin{array}{l}\tan 8° = \dfrac{12.5}{z} \\ z = \dfrac{12.5}{\tan 8°} \\ z = 88.9\end{array}\right\rangle\ 1.5\,marks$$

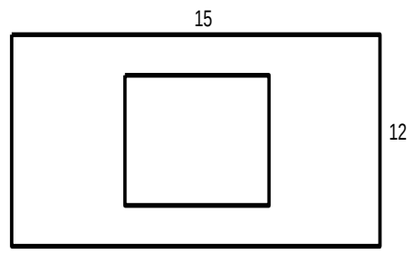
Find Distance Between Both Sailboats :

$$\left.\begin{array}{l}x = z - y \\ x = 88.9 - 32.6 \\ x = 56.3\,m\ \ is\ the\ distance\ between\ the\ boats.\end{array}\right\rangle\ 1\,mark$$

3 45. Shannon's rectangular dining room is 12 ft by 15 ft. There is a square rug that covers one-fourth the area of the floor. Determine the side length of the square rug. Express your answer in mixed radical form.

Find Area of Room:

$$\left|\ Area\ of\ Room = 12\,ft. \times 15\,ft. = 180\,ft.^2\right\rangle\ 0.5\,mark$$



Determine Area of Rug:

$$\left|\ Area\ of\ Rug = \frac{1}{4} \times 180\,ft.^2 = 45\,ft.^2\right\rangle\ 1\,mark$$

Determine Side Length:

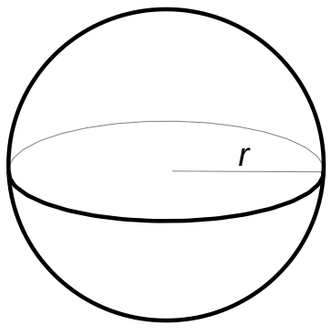
$$\left.\begin{array}{l}Side\ Length = \sqrt{45}\,ft. \\ Side\ Length = \left(\sqrt{9} \times 5\right) ft\end{array}\right\rangle\ 1\,mark$$

$$\left|\ Side\ Length = \left(3\sqrt{5}\right) ft\right\rangle\ 0.5\,mark$$

2 46a. The volume of a sphere is 248.5 cm^3. What is the radius correct to the nearest tenth of a centimetre?

Find Volume to Find Radius (*r*):

$$\left|\begin{array}{l} V=\frac{4}{3}\pi r^3 \\ 248.5=\frac{4}{3}\pi r^3 \end{array}\right\rangle \ 0.5\,mark$$



$$\left|\begin{array}{l} 3\times 248.5=4\pi r^3 \\ \frac{745.5}{4\pi}=\frac{4\pi r^3}{4\pi} \end{array}\right\rangle \ 1mark$$

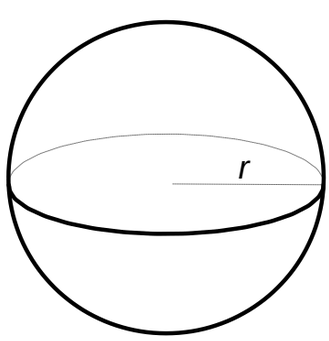
$$\left|59.3=r^3\right\rangle \ 0.5\,mark$$

$$\left|r=\sqrt[3]{59{,}3}=3.9\,cm\right\rangle \ 0.5\,mark$$

1 46b. What is the surface area of the sphere?

Use the radius (*r*) to find Surface Area:

$$\left|\begin{array}{l} S.A.=4\pi r^2 \\ S.A.=4\pi(3.9)^3 \end{array}\right\rangle \ 0.5\,mark$$



$$\left|\begin{array}{l} S.A.=4\pi(59.3) \\ S.A.=4(3.14)(59.3) \\ S.A.=744.8 \end{array}\right\rangle \ 0.5\ mark$$

3 47. Stephen completed a math problem and made a mistake. In which step does his error occur? Rewrite Stephen's solution so that it is correct.

$$\frac{\left(x^{\frac{1}{2}}y^{\frac{-1}{4}}\right)^{4}\left(x^{0}y^{\frac{-2}{3}}\right)^{-3}}{\left(x^{\frac{3}{2}}y\right)}$$

$\left|\textit{Error is in step } 3\right\rangle$ 1*mark*

Rewrite Solution Correcting Error:

$$\textit{Step } 1 = \frac{\left(x^{\frac{4}{2}}y^{\frac{-4}{4}}\right)\left(x^{0}y^{\frac{6}{3}}\right)}{\left(x^{\frac{3}{2}}y\right)}$$

$$= \frac{\left(x^{\frac{4}{2}}y^{\frac{-4}{4}}\right)\left(x^{0}y^{\frac{6}{3}}\right)}{\left(x^{\frac{3}{2}}y\right)}$$

$$\textit{Step } 2 = \frac{\left(x^{2}y^{-1}\right)\left(y^{2}\right)}{\left(x^{\frac{3}{2}}y\right)}$$

$$= \frac{\left(x^{2}y^{-1}\right)\left(y^{2}\right)}{\left(x^{\frac{3}{2}}y\right)}$$

$$\left|= \frac{\left(x^{2}y^{1}\right)}{\left(x^{\frac{3}{2}}y\right)}\right\rangle \ 1\textit{mark}$$

$$\textit{Step } 3 = \frac{\left(x^{2}y^{-2}\right)}{\left(x^{\frac{3}{2}}y\right)}$$

$$\left|= x^{\frac{1}{2}}y^{0}\right\rangle \ 0.5\textit{mark}$$

$$\textit{Step } 4 = x^{\frac{1}{2}}y^{-3}$$

$$\left|= x^{\frac{1}{2}}\right\rangle \ 0.5\textit{mark}$$

$$\textit{Step } 5 = \frac{x^{\frac{1}{2}}}{y^{3}}$$

3 48. Expand and simplify: $\left(2x^{2}+5x-6\right)\left(5x^{2}-2x+3\right)$

$$\left|= 2x^{2}\left(5x^{2}-2x+3\right)+5x\left(5x^{2}-2x+3\right)-6\left(5x^{2}-2x+3\right)\right\rangle \ 1\textit{mark}$$

$$\left|= 10x^{4}-4x^{3}+6x^{2}+25x^{3}-10x^{2}+15x-30x^{2}+12x-18\right\rangle \ 1\textit{mark}$$

$$\left|= 10x^{4}+21x^{3}-34x^{2}+33x-18\right\rangle \ 1\textit{mark}$$

3 49. Factor completely: $6x^3 - 2x^2 - 8x$

By Factoring:

$\left|2x(3x^2 - x - 4)\right\rangle$ 1 *mark*

$\left|2x(3x^2 + 3x - 4x - 4)\right\rangle$ 0.5 *mark*

$\left|2x[3x(x+1) - 4(x+1)\right\rangle$ 0.5 *mark*

$\left|2x\ (x+1)\ (3x-4)\right\rangle$ 1 *mark*

Using an Area Model:

$\left|2x(3x^2 - x - 4)\right\rangle$ 1 *mark*

Area Model scores 1 *mark*

	3x	-4
x	$3x^2$	-4 x
1	3 x	-4

$\left|\begin{array}{l} = 2x(3x^2 - x - 4) \\ = 2x(3x-4)(x+1) \end{array}\right\rangle$ 1 *mark*

3 50. Use an area model to multiply the binomials $(x+9)(x-4)$.

Area Model Setup is 1 mark.

Completing the model with the four terms (x^2, -4x, 9x and -36) is 1 mark.

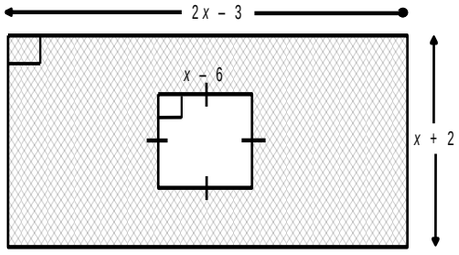
Determining the area is 1 mark.

$(x+9)(x-4) = x^2 - 4x + 9x - 36$

$= x^2 + 5x - 36$

	x	-4
x	x^2	-4 x
9	9 x	-36

3 51. Determine an expression, in simplest form, to represent the area of the shaded region.



Find Area of Rectangle:

$$\left.\begin{aligned} A_R &= (2x-3)(x+2) \\ A_R &= 2x^2+4x-3x-6 \\ A_R &= 2x^2+x-6 \end{aligned}\right\rangle 1\,mark$$

Find Area of Square:

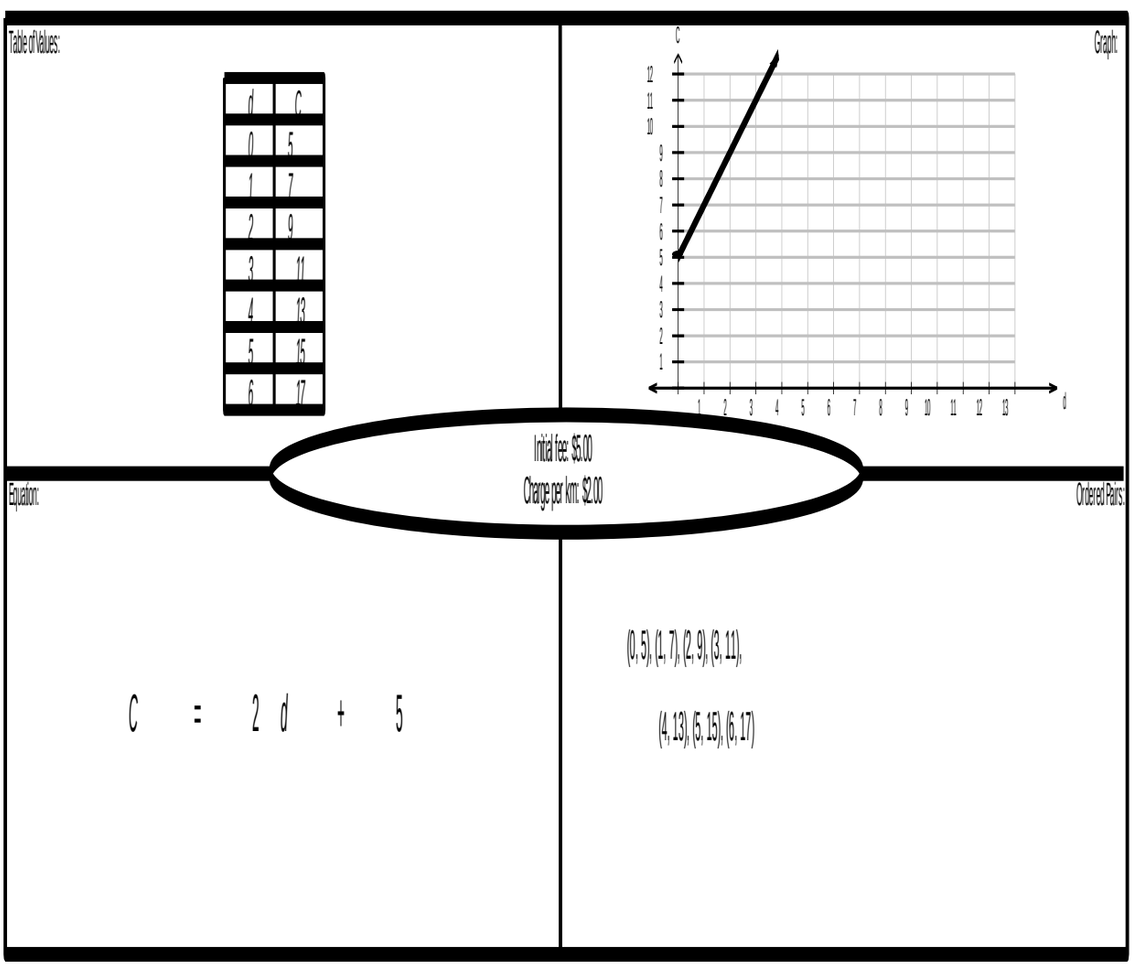
$$\left.\begin{aligned} A_S &= (x-6)(x-6) \\ A_S &= x^2-6x-6x+36 \\ A_S &= x^2-12x+36 \end{aligned}\right\rangle 1\,mark$$

Find Shaded Area:

$$\left.\begin{aligned} A_{Shaded} &= A_R - A_S \\ A_{Shaded} &= (2x^2+x-6)-(x^2-12x+36) \\ A_{Shaded} &= 2x^2+x-6-x^2+12x-36) \\ A_{Shaded} &= x^2+13x-42 \end{aligned}\right\rangle 1\,mark$$

4 52. A taxi company charges an initial fee of $5 plus $2 for every kilometer driven. Illustrate this relationship using each of the four methods requested in the table below. (Note: *d* is the distance travelled in km and *C* is the cost in dollars).

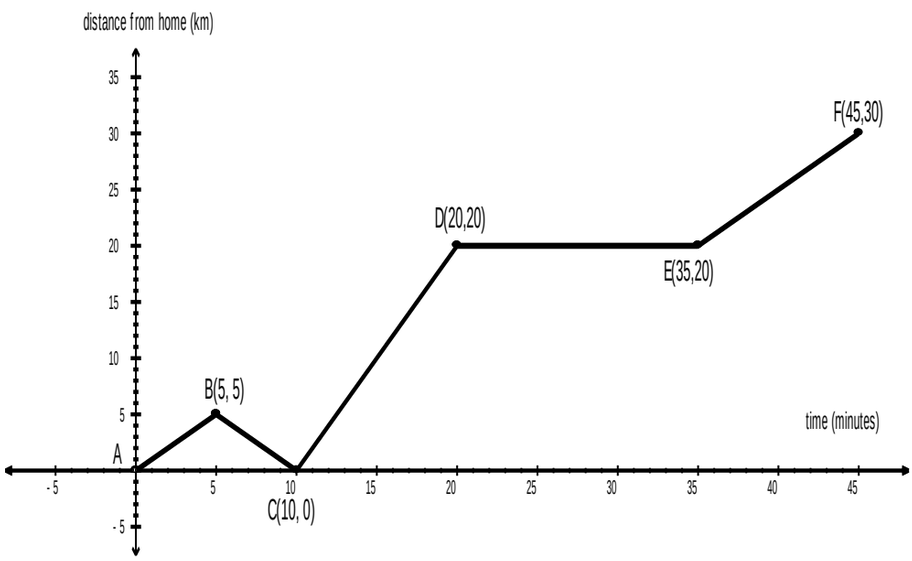
The solution in each box is valued at 1 mark.



Note: Students should not be penalized if they did not include the value 0 in the domain and the value 5 in the range. However, their table and graph should reflect this as well.

Whether or not the point (0, 5) should be included would make for a great class discussion during the unit.

4 53. The graph shows Brent leaving home at point A and travelling by truck to a friend's cabin located at point F.



a) What was his maximum rate of change (*i.e*. speed)?

Occurs Between Point C and D.

$\left| \frac{change\,in\,dist.}{change\,in\,time} = \frac{20\,mi.}{20\,\text{min.}} = 1 mi./\text{min.} \right\rangle$ 1 *mark*

b) Brent forgot his compass and had to turn around and go back home. How far was he from home when he had to go back?

$|5\,miles\rangle$ 1*mark*

c) Brent stopped to repair a flat tire. How long was he stopped?

$|he\,was\,stopped\,for\,15\,\text{min.}\rangle$ 1*mark*

d) How many kilometres did Brent put on the truck from the time he left home (**at point A**) until he arrived at the cabin?

$|40\,miles\rangle$ 1*mark*

4 54. A line passes through the points (8, -1) and (6, 2). Determine the equation of the line in general form (*i.e.* $Ax+By+C=0$).

Find the Slope of the Line:

$$\left.\begin{array}{l} slope=\dfrac{2-(-1)}{6-8} \\ slope=\dfrac{3}{-2} \\ slope=-\dfrac{3}{2} \end{array}\right\rangle 1mark$$

Determine the Equation of the Line

$$\left|y=-\frac{3}{2}x+b\right\rangle \ 0.5mark$$

Using the point (6, 2):

$$\left.\begin{array}{l} 2=-\dfrac{3}{2}(6)+b \\ b=11 \end{array}\right\rangle \ 0.5mark$$

Write equation of the line:

$$\left|y=-\frac{3}{2}x+11\right\rangle \ 0.5\ mark$$

Write equation in general form:

$$\left|2y=-3x+22\right\rangle \ 0.5\ mark$$

$$\left|3x+2y-22=0\right\rangle \ 1mark$$

4 55. Determine the equation of the line that passes through (6, -2) and is parallel to the line $4x-3y+12=0$.

$$\left.\begin{array}{l} 4x-3y+12=0 \\ -3y=-4x-12 \\ y=\dfrac{4}{3}x+4 \end{array}\right\rangle 1mark$$

$$\left.\begin{array}{l} m=\dfrac{4}{3} \\ \therefore y=\dfrac{4}{3}x+b \end{array}\right\rangle 1mark$$

$$\left.\begin{array}{l} -2=\dfrac{4}{3}(6)+b \\ -2=8+b \\ b=-10 \end{array}\right\rangle 1mark$$

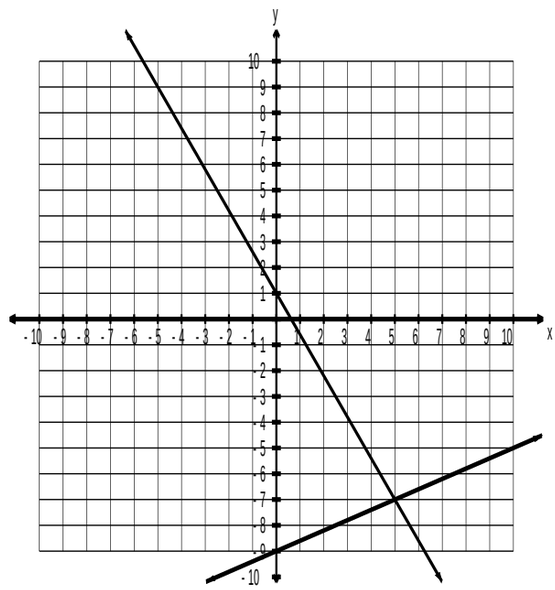
$$\left.\begin{array}{l} \therefore y=-\dfrac{4}{3}x-10 \end{array}\right\rangle 1mark$$

3 56. Solve this system of equations by graphing.

$$\begin{cases} 8x+5y=5 \\ 5y-2x=-45 \end{cases}$$

$$\left.\begin{array}{l} 8x+5y=5 \\ 5y=-8x+5 \\ y=\dfrac{-8}{5}x+1 \end{array}\right\rangle 0.5mark$$

$$\left.\begin{array}{l} 5y-2x=-45 \\ 5y=2x-45 \\ y=\dfrac{2}{5}x-9 \end{array}\right\rangle 0.5mark$$



0.5 mark for each line correctly graphed as shown at the right.

1 mark for clearly stating the solution as (5, -7) or labelling the point on the graph.

3 57. Solve this system of equations using substitution or elimination.

$$\begin{cases} -x + 7y = 35 \\ 12x + 14y = -28 \end{cases}$$

Using Substitution:

$$\left| \begin{array}{l} -x+7y=35 \\ x=7y-35 \end{array} \right\rangle \ 0.5 mark$$

$$\left| \begin{array}{l} 12x+14y=-28 \\ 12(7y-35)+14y=-28 \\ 84y-420+14y=-28 \\ 98y=392 \\ y=\dfrac{392}{98} \\ y=4 \end{array} \right\rangle \ 1.5 marks$$

$$\left| \begin{array}{l} x=7(4)-35 \\ x=28-35 \\ x=-7 \end{array} \right\rangle \ 0.5 mark$$

$$\left| Solution : (-7 , 4) \right\rangle \ 0.5 mark$$

Using Elimination:

Mult. eq 1 by -2 or 12 0.5 *mark*

$$\left| \begin{cases} 2x-14y=-70 \\ 12x+14y=-28 \end{cases} \right\rangle \ 1 mark$$

Vertically add equations to find x:

$$\left| \begin{array}{l} 14x=-98 \\ x=-7 \end{array} \right\rangle \ 1 mark$$

Solve for y:

$$\left| \begin{array}{l} -x+7y=35 \\ -(-7)+7y=35 \\ 7y=28 \\ y=4 \end{array} \right\rangle \ 1 mark$$

$$\left| Solution : (-7 , 4) \right\rangle \ 0.5 mark$$