Carlingford High School

Mathematics

Year 9 Term 1 Examination

5.3 Course

2017

Name: _____ Class: 5.3.___

Circle your teacher's name: Mrs Lobejko Mrs Lego Mr Fairlie

Time allowed: 55 minutes

- Board approved calculators may be used.
- Show all necessary working.
- Marks may be deducted for careless or untidy work.
- Questions marked with an asterisk * are extension level questions.
- Complete the examination in blue or black pen.

Topic	Earning Money	Linear Relationships	Total
Mark	/28	/27	/55
Extension*	/6	/6	/12
Total	/34	/33	/67

Question 1: Earning Money (34 Marks)

$1\ year = 52\ weeks$

$1 year = 26\ fortnights$

1. Which of the following is the highest annual salary?

   A. $2 224 per week

   B. $9 612 per month

   C. $4 440 per fortnight

   D. $115 753 per annum

2. Molly earns a royalty of 15% on net sales. There were $35 850 net sales in the last year. What is Molly's royalty payment?

   A. $5377.50 B. $30 472.50

   C. $35 850.00 D. $41 227.50

3. Gayle's gross pay each week is $952.25. The following deductions are taken from her gross pay each week:

   - tax $180.93
   - superannuation $85.70
   - union membership $21.40
   - health fund $38.15.

   What is Gayle's net pay each week?

   A. $326.18 B. $626.07

   C. $771.32 D. $952.25

4. Calculate the simple interest earned on $3480 at 5.5% p.a. for 4 years.

   A. $7656 B. $191.40

   C. $765.60 D. $4245.60

5. A real estate agent sells a house for $400 000. From the selling price he earns $10 000 for his services. Which term is used to describe the money he earns?

   A . Commission

   B. Income tax

   C. Royalty

   D. Superannuation

6. Dylan is a tiler who is paid $18.10 per hour for the first 7 hours, time-and-a-half for the next 2 hours, and double-time thereafter. Calculate Dylan's wage for a week where he worked 11 hours. (3 marks)

7. Richard purchased a house for $325 000 in 1990 and sold it for $594 750 in 2001. Express the profit as a percentage of the cost price. (2 marks)	9. A camera costs $449, including 10% GST. What is the price of the camera without GST, correct to the nearest dollar? (2 marks)
8. A doctor charges $22.50 for consultations that last less than 10 minutes and $28.75 for those that last longer than 10 minutes. How much will she be paid for a day in which she sees 19 patients each for less than 10 minutes and 14 patients for longer than 10 minutes. (2 marks)	10. Jane has a job selling jewellery. She is paid a retainer of $350 per week plus a commission of 5.5% on the sales in excess of $600. i) What does Jane earn in a week when she makes sales of $1050? (2 marks) ii) What are Jane's sales in a week if she was paid $397.30? (2 marks)

11. Kylie earns $760 per week. She is entitled to 4 weeks annual leave and receives an additional holiday loading of 17.5%. Calculate Kylie's:

i) holiday loading. (2 marks)

ii) total pay for this holiday period.

*12. Connor works a 35-hour week and is paid $18.25 per hour. Any overtime is paid at time-and-a-half.

Connor wants to earn enough overtime to earn at least $800 each week. What is the minimum number of hours overtime that Connor will need to work? (3 marks)

*13. Mary invested $13 000 for 5 years and earned $2100 in interest. What was the annual simplest interest rate, to two decimal places? (3 marks)

14. Alice's gross salary is $53 364. In the last 12 months she earned interest of $294.50 on her savings, $2870 on a real estate investment and had allowable tax deductions totalling $385.40. During the year, she had already paid PAYG instalments amounting to $11824. Find:

i) Alice's gross annual income.

ii) Alice's taxable income.

iii) How much Alice must pay as her Medicare levy of 1.5%.

iv) Using the tax table below, calculate the tax payable on Alice's taxable income. (2 marks)

Taxable income	Tax payable
$1–$6000	Nil
$6001–$20 000	17 cents for each $1 over $6000
$20 001–$50 000	$2380 + 30 cents for each $1 over $20 000
$50 001–$60 000	$11 380 + 42 cents for each $1 over $50 000
$60 001 and over	$15 580 + 47 cents for each $1 over $60 000

v) Will Alice receive a tax refund or will she have a debt? Support your answer with calculations. (2 marks)

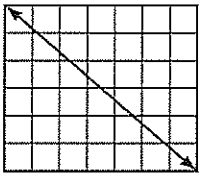
Linear Relationships: (33 Marks)

1. Which of the following lines contains the point $(2, -2)$?

   A. $y = 3x - 8$ B. $y = -3x - 3$

   C. $y = 4x + 18$ D. $y = -4x - 11$

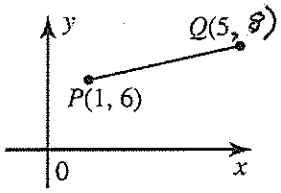
2. Find the slope of the line drawn below.



   A. $\frac{6}{7}$ B. $\frac{7}{6}$

   C. $-\frac{6}{7}$ D. $-\frac{7}{6}$

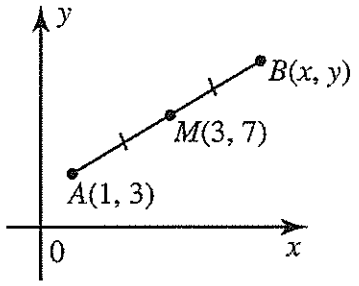
3. Use Pythagoras's theorem to find the length of the interval PQ, correct to one decimal place. (2 marks)



4. Write the equation $2x - 3y + 1 = 0$ in gradient-intercept form. (2 marks)

5. A circle with centre $(7, 5)$ passes through the point $(1, -2)$. Find the length of the radius, leaving your answer In exact form. (2 marks)

6. Find the co-ordinates of B, given that M is the midpoint of AB. (2 marks)



7. What are the gradient and y-intercept of the lines below? (4 marks)

i) $y = 2x + 3$

$m =$ _____ $b =$ _____

ii) $y = 3 - \frac{1}{2}x$

$m =$ _____ $b =$ _____

8. The lines $x = 2$ and $y = -9$ intersect at R while the lines $x = -1$ and $y = 3$ intersect at S. Find the gradient of the line RS. (2 marks)

9. Find the equation of the line that is parallel to $y = 2x + 9$ and passes through the origin. (1 mark)

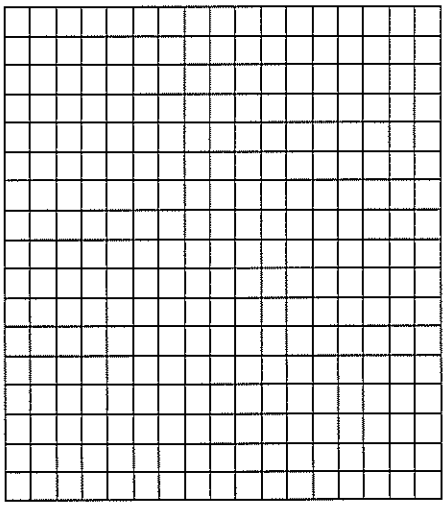
10. A straight line passes through the point $(-1, 4)$ with a gradient of 2.

i) Find the equation of the line in the form $y = mx + b$. (2 marks)

ii) Express this equation in general form.

iii) Find the x and y intercepts of the line. (2 marks)

iv) Graph the line on the number plane below, clearly showing the intercepts. (2 marks)



11. Find the equation of the line that passes through the points $(1, 6)$ and $(5, 14)$. Express your answer in general form. (3 marks).

*12. Find the equation of the line that is perpendicular to $y = \frac{1}{4}x + 6$ and passes through the point $(5, -1)$. (3 marks).

*13. A square has vertices $A\ (2, -3)$, $B\ (6, 3)$ $C\ (0, 7)$ and $D\ (-4, 1)$.

Show that the diagonals bisect each other at right angles. (3 marks)

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7. Richard purchased a house for $325 000 in 1990 and sold it for $594 750 in 2001. Express the profit as a percentage of the cost price. (2 marks)

profit = $269750 (1)

$\% = \frac{269750}{325000} \times 100$

$= 83\%$ (1)

9. A camera costs $449, including 10% GST. What is the price of the camera without GST, correct to the nearest dollar? (2 marks)

110 % = $449

10 % = $40.818... (1)

100 % = $408.18 (1)

8. A doctor charges $22.50 for consultations that last less than 10 minutes and $28.75 for those that last longer than 10 minutes. How much will she be paid for a day in which she sees 19 patients each for less than 10 minutes and 14 patients for longer than 10 minutes. (2 marks)

(1) → pay = ($22.50 x 19) + ($28.75 x 14)

= $830 (1)

10. Jane has a job selling jewellery. She is paid a retainer of $350 per week plus a commission of 5.5% on the sales in excess of $600.

i) What does Jane earn in a week when she makes sales of $1050? (2 marks)

Commission = $450 x 5.5%

= $24.75 (1)

wage = $350 + $24.75

= $374.75 (1)

ii) What are Jane's sales in a week if she was paid $397.30? (2 marks)

$397.30 - $350

= $47.30

sales x 5.5% = $47.30

sales = $860 (1)

∴ total sales = $860 + $600

= $1460 (1)

(7)

Question 1: Earning Money (3+Marks)

$1\ year = 52\ weeks$

$1 year = 26\ fortnights$

1. Which of the following is the highest annual salary?

   A. $2 224 per week

   B. $9 612 per month

   C. $4 440 per fortnight

   (D.) $115 753 per annum

2. Molly earns a royalty of 15% on net sales. There were $35 850 net sales in the last year. What is Molly's royalty payment?

   (A.) $5377.50 B. $30 472.50

   C. $35 850.00 D. $41 227.50

3. Gayle's gross pay each week is $952.25. The following deductions are taken from her gross pay each week:

   - tax $180.93
   - superannuation $85.70
   - union membership $21.40
   - health fund $38.15.

   What is Gayle's net pay each week?

   A. $326.18 (B.) $626.07

   C. $771.32 D. $952.25

4. Calculate the simple interest earned on $3480 at 5.5% p.a. for 4 years.

   A. $7656 B. $191.40

   (C.) $765.60 D. $4245.60

5. A real estate agent sells a house for $400 000. From the selling price he earns $10 000 for his services. Which term is used to describe the money he earns?

   (A.) Commission

   B. Income tax

   C. Royalty

   D. Superannuation

6. Dylan is a tiler who is paid $18.10 per hour for the first 7 hours, time-and-a-half for the next 2 hours, and double-time thereafter. Calculate Dylan's wage for a week where he worked 11 hours. (3 marks)

normal = $\$18.10 \times 7$
= $\$126.70$

$1\frac{1}{2}$ times = $\$18.10 \times 1.5 \times 2$
= $\$54.30$

double = $\$18.10 \times 2 \times 2$
= $\$72.40$

(2)

total = $\$126.70 + \$54.30$
$+ \$72.40$

= $\$253.40$ (1)

11. Kylie earns $760 per week. She is entitled to 4 weeks annual leave and receives an additional holiday loading of 17.5%. Calculate Kylie's:

i) holiday loading. (2 marks)

$760 × 4 = $3040 (1)

loading = $3040 × 17.5%

= $532 (1)

ii) total pay for this holiday period.

total pay = $3040 + $532

= $3572

*12. Connor works a 35-hour week and is paid $18.25 per hour. Any overtime is paid at time-and-a-half.

Connor wants to earn enough overtime to earn at least $800 each week. What is the minimum number of hours overtime that Connor will need to work? (3 marks)

35 × $18.25 = $638.75 (1)

$800 − $638.75 = $161.25

1.5 × $18.25 × n = $161.25

n = 5.890. (1)

∴ number of hours = 6 (1)

*13. Mary invested $13 000 for 5 years and earned $2100 in interest. What was the annual simplest interest rate, to two decimal places? (3 marks)

I = prn

2100 = 13000 × r × 5 (1)

0.0323... = r (1)

∴ r = 0.0323 × 100

= 3.23% (1)

14. Alice's gross salary is $53 364. In the last 12 months she earned interest of $294.50 on her savings, $2870 on a real estate investment and had allowable tax deductions totalling $385.40. During the year, she had already paid PAYG instalments amounting to $11824. Find:

i) Alice's gross annual income.

$\$53364 + \$294.50 + \$2870$
$= \$56528.50$

ii) Alice's taxable income.

$\$56528.50 - \$385.40$
$= \$56143.10$

iii) How much Alice must pay as her Medicare levy of 1.5%.

$\$56143.10 \times 1.5\%$
$= \$842.15$

iv) Using the tax table below, calculate the tax payable on Alice's taxable income. (2 marks)

Taxable income	Tax payable
$1–$6000	Nil
$6001–$20 000	17 cents for each $1 over $6000
$20 001–$50 000	$2380 + 30 cents for each $1 over $20 000
$50 001–$60 000	$11 380 + 42 cents for each $1 over $50 000
$60 001 and over	$15 580 + 47 cents for each $1 over $60 000

$\$11380 + (\$56143.10 - \$50000) \times 0.42$ (1)

$= \$13960.10$ (1)

v) Will Alice receive a tax refund or will she have a debt? Support your answer with calculations. (2 marks)

total tax to pay $= \$13960.10 + \$842.15$
$= \$14802.25$ (1)

$\therefore$ debt $= \$14802.25 - \$11824$

(1) $= \$2978.25$

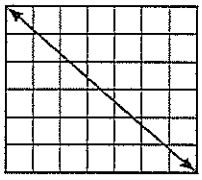
Linear Relationships: (33 Marks)

1. Which of the following lines contains the point $(2, -2)$?

(A) $y = 3x - 8$ B. $y = -3x - 3$

C. $y = 4x + 18$ D. $y = -4x - 11$

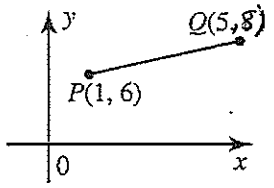
2. Find the slope of the line drawn below.



A. $\frac{6}{7}$ B. $\frac{7}{6}$

(C) $-\frac{6}{7}$ D. $-\frac{7}{6}$

3. Use Pythagoras's theorem to find the length of the interval PQ, correct to one decimal place. (2 marks)



$PQ = \sqrt{4^2 + 2^2}$

$= \sqrt{16+4}$

$= \sqrt{20}$ (1)

$= 4.5$ units (1)

4. Write the equation $2x - 3y + 1 = 0$ in gradient-intercept form. (2 marks)

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

$\frac{2}{3}x + \frac{1}{3} = y$

$\therefore y = \frac{2}{3}x + \frac{1}{3}$ (1)

5. A circle with centre $(7, 5)$ passes through the point $(1, -2)$. Find the length of the radius, leaving your answer in exact form. (2 marks)

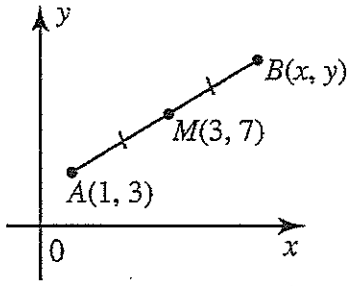
$d = \sqrt{(7-1)^2 + (5--2)^2}$ (1)

$= \sqrt{6^2 + 7^2}$

$= \sqrt{36 + 49}$

$= \sqrt{85}$ units (1)

6. Find the co-ordinates of B, given that M is the midpoint of AB. (2 marks)



$3 = \frac{x+1}{2}$ $7 = \frac{y+3}{2}$

$6 = x + 1$ $14 = y + 3$

$5 = x$ $11 = y$

(1) (1)

$\therefore B(5, 11)$

7. What are the gradient and y-intercept of the lines below? (4 marks)

i) $y = 2x + 3$

$m =$ 2 $\quad b =$ 3

ii) $y = 3 - \frac{1}{2}x$

$m =$ $-\frac{1}{2}$ $\quad b =$ 3

8. The lines $x = 2$ and $y = -9$ intersect at R while the lines $x = -1$ and $y = 3$ intersect at S. Find the gradient of the line RS. (2 marks)

$R(2, -9) \quad S(-1, 3)$

$m = \frac{-9-3}{2-1}$ (1)

$= \frac{-12}{3}$

$= -4$ (1)

9. Find the equation of the line that is parallel to $y = 2x + 9$ and passes through the origin. (1 mark)

$m = 2$

$y = 2x$ (1)

10. A straight line passes through the point $(-1, 4)$ with a gradient of 2.

i) Find the equation of the line in the form $y = mx + b$. (2 marks)

$4 = 2(-1) + b$

$4 = -2 + b$

(1) $6 = b$

$\therefore y = 2x + 6$ (1)

ii) Express this equation in general form.

$2x - y + 6 = 0$

iii) Find the x and y intercepts of the line. (2 marks)

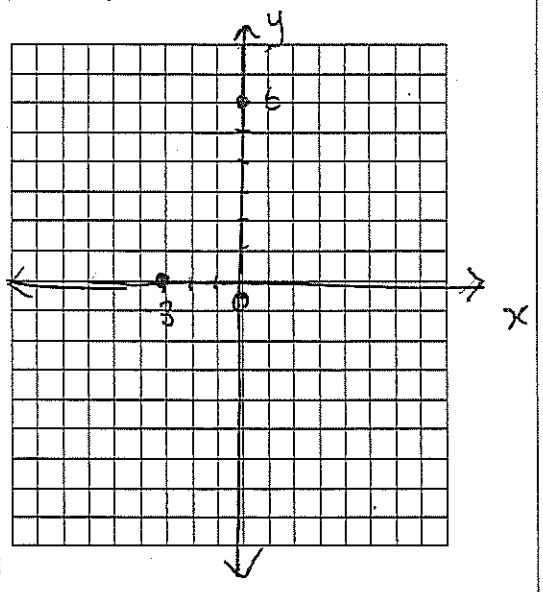
x-int when $y = 0$

$x = -3$ (1)

y-int when $x = 0$

$y = 6$ (1)

iv) Graph the line on the number plane below, clearly showing the intercepts. (2 marks)



11. Find the equation of the line that passes through the points $(1, 6)$ and $(5, 14)$. Express your answer in general form. (3 marks).

$m = \frac{14-6}{5-1}$

$= 2$ (1)

$y - y_1 = m(x - x_1)$

$y - 6 = 2(x - 1)$

$y - 6 = 2x - 2$ (1)

$0 = 2x - y - 2 + 6$

$\therefore\ 2x - y + 4 = 0$ (1)

*12. Find the equation of the line that is perpendicular to $y = \frac{1}{4}x + 6$ and passes through the point $(5, -1)$. (3 marks).

$m = -4$ (1)

$y - -1 = -4(x - 5)$

$y + 1 = -4x + 20$ (1)

$4x + y - 19 = 0$ (1) either

or

$y = -4x + 19$

*13. A square has vertices $A\ (2, -3)$, $B\ (6, 3)$ $C\ (0, 7)$ and $D\ (-4, 1)$.

Show that the diagonals bisect each other at right angles. (3 marks)

midpt AC = (1, 2)
midpt BD = (1, 2) } (1)

m of AC = −5
m of BD = $\frac{1}{5}$ } (1)

$m_1 \times m_2 = -5 \times \frac{1}{5}$

$= -1$

$\therefore$ diagonals bisect each other at right angles as the midpoints are the same, and the gradients multiply to −1. (1)