

J.M.J.

MARCELLIN COLLEGE RANDWICK



YEAR 9

MATHEMATICS Stage 5.3

2014 ASSESSMENT TASK # 4

STUDENT NAME: \_\_\_\_\_

TEACHER: \_\_\_\_\_

Time Allowed: 90 minutes

Weighting: 35%

Directions:

- Answer all questions in the space provided.
- Show all necessary working.
- Where more than one mark is allocated to a question, full marks will not be awarded for answers only
- Marks may not be awarded for careless or badly arranged work
- Calculators may be used

Consumer Arithmetic		/22
Coordinate Geometry		/21
Statistics		/14
Trigonometry		/23

TOTAL

/80

CONSUMER ARITHMETIC (22 marks)

1. Peter's salary is \$70 000 and he gets a pay rise of 4% every year. What will his salary be after 3 years? 2

2. Frank earns \$1550 per week.

- i. How much will he receive for holiday loading if he is entitled to 17.5% of 4 weeks' wage? 2

- ii. How much will Frank receive in total when he leaves for his 4 weeks holiday. 1

3. What is the final price if successive discounts of 20% and 10 % are applied to a retail price of \$1800? 2

4. Steven received a salary of \$85500 and other income ( investments) of \$1200 during the year. His total tax deductions were \$3408. He had already paid tax instalments amounting to \$17000 for the year.

taxable income	Tax on this income
\$0 - \$18,200	Nil
\$18,201 - \$37,000	19c for each \$1 over \$18,200
\$37,001 - \$80,000	\$3,572 plus 32.5c for each \$1 over \$37,000
\$80,001 - \$180,000	\$17,547 plus 37c for each \$1 over \$80,000
Over \$180,000	\$54,547 plus 45c for each \$1 over \$180,000

- i. What is Steven's total income. 1
- ii. What is his taxable income? 1
- iii. Calculate the amount Steven needs to pay for the Medicare levy (1.5% of taxable income). 1
- iv. Is Steven entitled to a refund or does he owe money, and what is the amount? 2

5. The selling price for a television is \$1240. The shop makes 40% profit on each television sold. What was the cost price? 1

6. Frank earns \$16 per hour working at the local café. His weekly shift includes 12 hours at normal time and 4 hours at "time and a half".

a) Calculate Francis' weekly pay. 1

b) Frank wants to earn \$360 in a particular week. How many hours overtime will he need to work to achieve this? 2

7. Patricia bought a car for \$ 10050, on terms of \$300 deposit and 60 monthly repayments of \$260.

a) Find the total amount paid for the car. 2

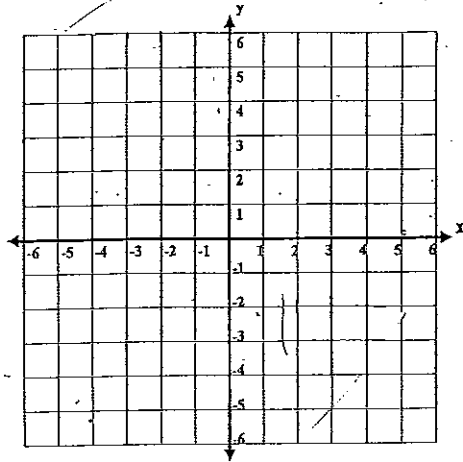
b) What amount of interest was paid? 1

c) What was the amount of interest paid each year? 1

d) Find the annual simple interest rate on the amount borrowed. 2

COORDINATE GEOMETRY (21 marks)

1. Plot the points X (-2,6) and Y (2,-2) on the following number plane. 2



- a) What is the gradient of the interval XY? 2

- b) What is the midpoint of the interval XY? 2

- c) Calculate the distance between X and Y. 2

2. The equation of a straight line is  $y = 4x + 1$ . What is the

a) Gradient 1

b) Y intercept 1

3. The equation of a straight line is  $3x + 2y - 6 = 0$

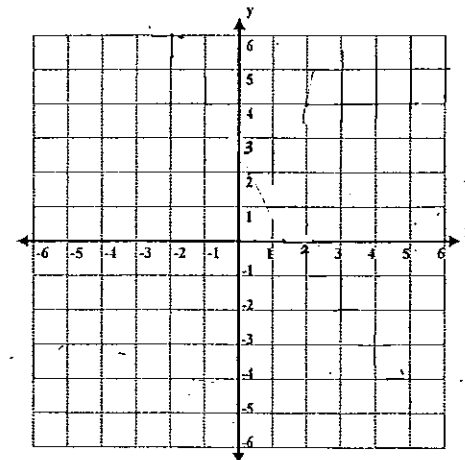
- a) Find the x and y intercepts of this line.

X intercept: \_\_\_\_\_

Y intercept: \_\_\_\_\_

- b) Write the equation of this line in  $y = mx + b$  form.

- c) Graph the line on the axes below. 1



STATISTICS (14 marks)

4. Find the equation of the line that passes through the point (1,4) and has a gradient of 2. 2

5. The line  $4x + py + 2 = 0$  has a gradient of 2. Find the value of  $p$ . 2

6. Find the equation of the line that passes through point A (-2, 5) and point B (4, 3). Write this equation in general form. 3

1. a) Fill in the following cumulative frequency table. 2

Score	Frequency	$f \times x$	Cumulative frequency
10	2		
11	0		
12	5		
13	4		
14	5		
15	6		
16	5		
17	6		
18	3		
19	4		

b) Use the data above to find the: 4

- i) Range:
- ii) Mode:
- iii) Mean:
- iv) Median:

2. Find the interquartile range for the following set of scores: 2

60, 78, 79, 80, 83, 84, 88, 90, 92, 94, 95, 99.

3. a) Complete an ordered stem and leaf plot for the following set of 21 scores:

8, 15, 10, 25, 34, 10, 8,  
 8, 15, 16, 32, 43, 51, 8,  
 41, 27, 16, 9, 28, 31, 54.

Stem	Leaf
0	
1	
2	
3	
4	
5	

2

b) Comment on the shape of the data distribution shown in the stem and leaf plot.

1

c) Find the: i) mode

1

ii) median

1

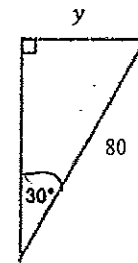
iii) range

1

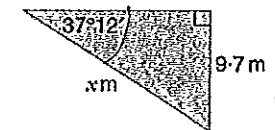
### TRIGONOMETRY (23 marks)

1. Find the value of the pronumeral:

i.



ii.



4

2. Find the value of each marked angle:

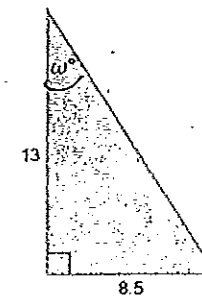
i. to the nearest degree.

2



ii. to the nearest minute.

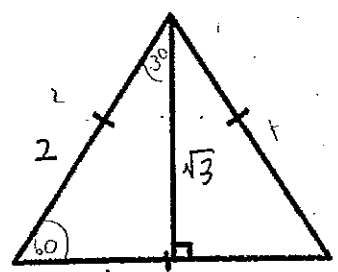
2



3. An isosceles triangle has the equal lengths of 30cm and a base of 40cm. Calculate the perpendicular height of this triangle. 2

4. A rectangular gate measures 2.4m by 1.4m. The gate is strengthened by diagonal wooden lengths. What angle will the diagonal beam make with the base length, to the nearest minute. 2

5. If all sides of an equilateral triangle are 2 cm, find the exact value of  $\sin 60$ .



Use the diagram above to label any angles or lengths.

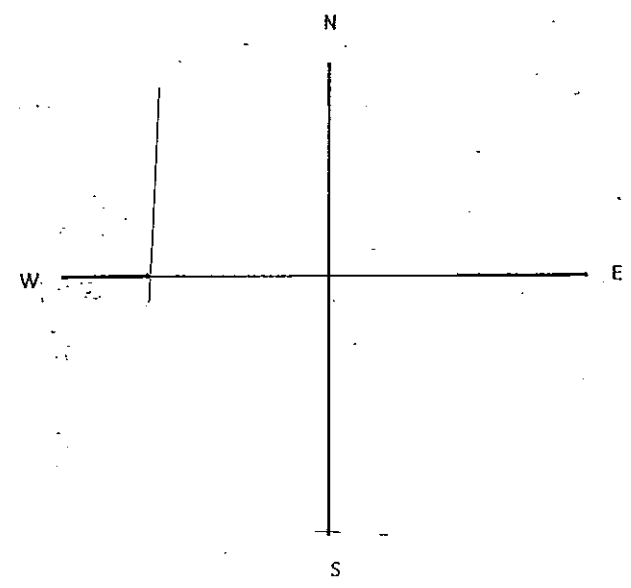
a) Find the perpendicular height of the triangle. 2

b) Find the area of the triangle 2

8. A ship is 4 kms from a wharf on a bearing of  $321^\circ$ , and a lighthouse is 12 kms from the wharf on a bearing of  $231^\circ$ .

a) Show this information clearly on the axes below

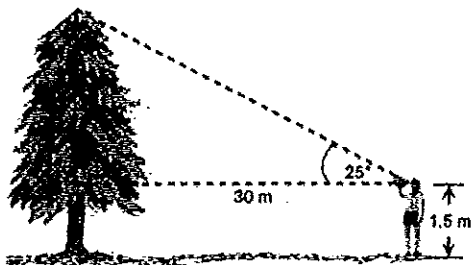
3



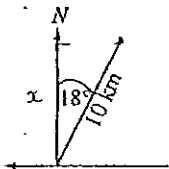
b) Find the bearing of the ship from the lighthouse. (Answer correct to the nearest minute.)

End of exam

6. A sighting is taken to the top of the tree, standing 30m away on level ground. How tall is the tree? 2



7. A rally driver drove 10km on a bearing of  $018^\circ$ . How far north did he travel, to 2 decimal places?



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YEAR 9

MATHEMATICS Stage 5.3

2014 ASSESSMENT TASK # 4

STUDENT NAME: MASTER COPY

TEACHER: (SOLUTIONS)

Time Allowed: 90 minutes

Weighting: 35%

Directions:

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Consumer Arithmetic	/22
Coordinate Geometry	/21
Statistics	/14
Trigonometry	/23

TOTAL /80

CONSUMER ARITHMETIC (22 marks)

1. Peter's salary is \$70 000 and he gets a pay rise of 4% every year. What will his salary be after 3 years? 2

$$\frac{104}{100} \times 70\,000 = 72\,800$$

$$\frac{104}{100} \times 72\,800 = 75\,712$$

$$\frac{104}{100} \times 75\,712 = \$78\,740.48$$

2. Frank earns \$1550 per week.

i. How much will he receive for holiday loading if he is entitled to 17.5% of 4 weeks' wage? 2

$$\frac{17.5}{100} \times (4 \times 1550) = 0.175 \times 6200 = \$1085$$

ii. How much will Frank receive in total when he leaves for his 4 weeks holiday. 1

$$6200 + 1085 = \$7285$$

3. What is the final price if successive discounts of 20% and 10% are applied to a retail price of \$1800? 2

$$\frac{80}{100} \times 1800 = 1440$$

$$\frac{90}{100} \times 1440 = \$1296$$



4. Steven received a salary of \$85500 and other income (Investments) of \$1200 during the year. His total tax deductions were \$3408. He had already paid tax instalments amounting to \$17000 for the year.

Taxable Income	Tax on this Income
\$0 - \$18,200	Nil
\$18,201 - \$37,000	19c for each \$1 over \$18,200
\$37,001 - \$80,000	\$3,572 plus 32.5c for each \$1 over \$37,000
\$80,001 - \$180,000	\$17,547 plus 37c for each \$1 over \$80,000
Over \$180,000	\$54,547 plus 45c for each \$1 over \$180,000

- i. What is Steven's total income.

$$85500 + 1200 = \$86700$$

- ii. What is his taxable income?

$$86700 - 3408 = \$83292$$

- iii. Calculate the amount Steven needs to pay for the Medicare levy (1.5% of taxable income).

$$\frac{1.5}{100} \times 83292 = \$1249.38$$

- iv. Is Steven entitled to a refund or does he owe money, and what is the amount?

$$\begin{aligned} \text{tax payable} &= 17547 + (0.37 \times 392) \\ &= 17547 + 145.04 \\ &= \$17692.04 \end{aligned}$$

$\therefore$  he owes  $17692.04 - 17000 = \$692.04$

5. The selling price for a television is \$1240. The shop makes 40% profit on each television sold. What was the cost price?

$$140\% = 1240$$

$$1\% = 8\frac{6}{7}$$

$$100\% = \$885.71 \text{ (2dp)}$$

6. Frank earns \$16 per hour working at the local café. His weekly shift includes 12 hours at normal time and 4 hours at "time and a half".

- a) Calculate Francis' weekly pay.

$$(12 \times 16) + (4 \times 16 \times 1.5) = 192 + 96 = \$288$$

- b) Frank wants to earn \$360 in a particular week. How many hours overtime will he need to work to achieve this?

$$= (12 \times 16) + (x \times 16 \times 1.5)$$

$$= 192 + (16x \times 1.5) = 360$$

$$-192 \qquad \qquad \qquad -192$$

$$16x \times 1.5 = \frac{168}{1.5}$$

$$\frac{16x}{16} = \frac{112}{16}$$

$$x = 7$$

$\therefore$  he needs to work

$$7 - 4 = 3 \text{ hrs overtime}$$

7. Patricia bought a car for \$10050, on terms of \$300 deposit and 60 monthly repayments of \$260.

- a) Find the total amount paid for the car.

$$300 + (60 \times 260) = 300 + 15600 = \$15900$$

- b) What amount of interest was paid?

$$I = 15900 - 10050 = \$5850$$

- c) What was the amount of interest paid each year?

$$60 \div 12 = 5$$

$$5850 \div 5 = \$1170$$

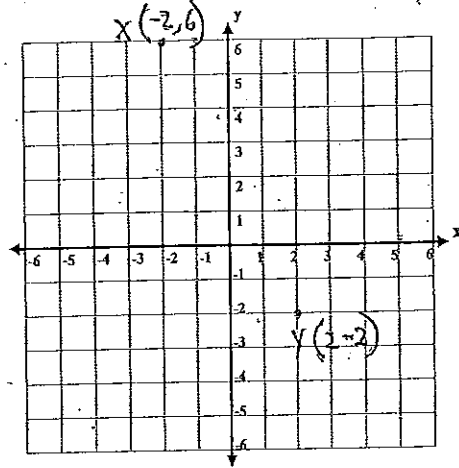
- d) Find the annual simple interest rate on the amount borrowed.

$$\frac{1170}{9750} \times \frac{100}{1} = 12\% \text{ p.a.}$$

amount borrowed = \$9750

COORDINATE GEOMETRY (21 marks)

1. Plot the points X(-2,6) and Y(2,-2) on the following number plane. 2



- a) What is the gradient of the interval XY? 2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 6}{2 - (-2)} = \frac{-8}{4} = -2$$

- b) What is the midpoint of the interval XY? 2

$$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left( \frac{-2 + 2}{2}, \frac{6 + (-2)}{2} \right) = \left( \frac{0}{2}, \frac{4}{2} \right) = (0, 2)$$

- c) Calculate the distance between X and Y. 2

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(2 + 2)^2 + (-2 - 6)^2}$$

$$d = \sqrt{16 + 64} = 8.94 \text{ (2dp) units}$$

2. The equation of a straight line is  $y = 4x + 1$ . What is the

a) Gradient = 4 1

b) Y intercept = 1 1

$$2y = -\frac{3x+6}{2}$$

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

3. The equation of a straight line is  $3x + 2y - 6 = 0$

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

$$y = 0 + 3$$

$$y = 3$$

- a) Find the x and y intercepts of this line. 2

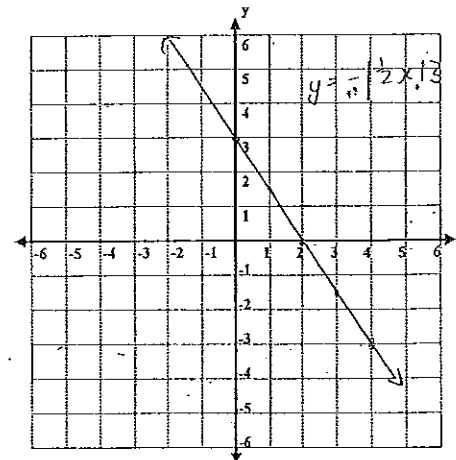
X intercept: 2

Y intercept: 3

- b) Write the equation of this line in  $y = mx + b$  form. 1

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

- c) Graph the line on the axes below. 1



x	0	1	2	3	4
y	3	1.5	0	-1.5	-3

6

STATISTICS (14 marks)

4. Find the equation of the line that passes through the point (1,4) and has a gradient of 2. 2

$$y - y_1 = m(x - x_1) \quad y = 2x + 2$$

$$y - 4 = 2(x - 1)$$

$$y - 4 = 2x - 2$$

$$y = 2x + 2$$

5. The line  $4x + py + 2 = 0$  has a gradient of 2. Find the value of  $p$ . 2

$$4x + py + 2 = 0$$

$$py = -4x - 2$$

$$\frac{py}{p} = \frac{-4x - 2}{p}$$

$$y = \frac{-4x - 2}{p}$$

$$\frac{-4}{p} = 2$$

$$\frac{-4}{2} = \frac{2p}{2} \quad p = -2$$

6. Find the equation of the line that passes through point A (-2, 5) and point B (4, 3). Write this equation in general form. 3

$$\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$0 = -2x - 6y + 26$$

$$0 = \frac{2x}{2} + \frac{6y}{2} - \frac{26}{2}$$

$$0 = x + 3y - 13$$

$$\frac{y - 5}{x + 2} = \frac{3 - 5}{4 - (-2)}$$

$$\frac{y - 5}{x + 2} = \frac{-2}{6}$$

$$6(y - 5) = -2(x + 2)$$

$$6y - 30 = -2x - 4$$

$$2x + 6y - 26 = 0$$

1. a) Fill in the following cumulative frequency table. 2

Score	Frequency	$f \times x$	Cumulative frequency
10	2	20	2
11	0	0	2
12	5	60	7
13	4	52	11
14	5	70	16
15	6	90	22
16	5	80	27
17	6	102	33
18	3	54	36
19	4	76	40
	40	604	

b) Use the data above to find the:

- i) Range:  $19 - 10 = 9$
- ii) Mode: 15, 17
- iii) Mean:  $\frac{604}{40} = 15.1$
- iv) Median:  $\frac{15 + 15}{2} = 15$

2. Find the interquartile range for the following set of scores: 2

60, 78, 79, 80, 83, 84, 88, 90, 92, 94, 95, 99.

$$Q_1 = 77.5 \quad Q_2 = \frac{84 + 88}{2} = 86$$

$$\therefore IQR = Q_3 - Q_1$$

$$= 93 - 79.5$$

$$= 13.5$$

3. a) Complete an ordered stem and leaf plot for the following set of 21 scores:

8, 15, 10, 25, 34, 10, 8,  
8, 15, 16, 32, 43, 51, 8,  
41, 27, 16, 9, 28, 31, 54.

0	8, 8, 8, 9
1	0, 0, 5, 5, 6, 6
2	5, 7, 8
3	1, 2, 4
4	3, 1
5	1, 4

Stem	Leaf
0	8, 8, 8, 9, 9
1	0, 0, 5, 5, 6, 6
2	5, 7, 8
3	1, 2, 4
4	3, 1
5	1, 4

2 2

b) Comment on the shape of the data distribution shown in the stem and leaf plot. It is positively skewed.

1

c) Find the: i) mode = 8

1

ii) median = 16

1

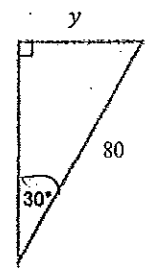
iii) range  $54 - 8 = 46$

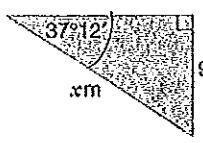
1

6

TRIGONOMETRY (23 marks)

1. Find the value of the pronumeral:

i.   $\sin 30 = \frac{y}{80}$   
 $y = 80 \sin 30$   
 $y = 40 \text{ units}$

ii.   $\sin 37^\circ 12' = \frac{x}{9.7}$   
 $x = \frac{9.7}{\sin 37^\circ 12'}$

4

4

2. Find the value of each marked angle:

i. to the nearest degree  $\frac{1}{k}$



$\cos \theta = \frac{7}{12}$

2

$\theta = \cos^{-1} \frac{7}{12}$

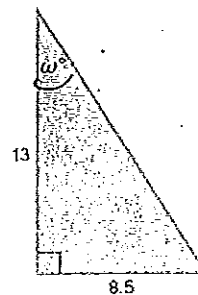
$\theta = 54^\circ 19'$

$\theta = 54^\circ$  (nearest degree)

$\theta = 54^\circ$  (nearest degree)

ii. to the nearest minute.

2



$\tan w = \frac{8.5}{13}$

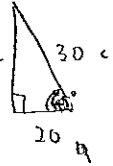
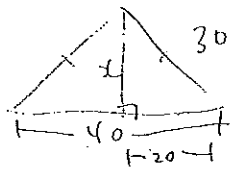
2

$w = \tan^{-1} \frac{8.5}{13}$

$w = 33^\circ 11'$  (nearest minute)

8

3. An isosceles triangle has the equal lengths of 30cm and a base of 40cm. Calculate the perpendicular height of this triangle. 2



$$c^2 = a^2 + b^2$$

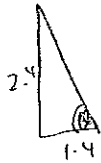
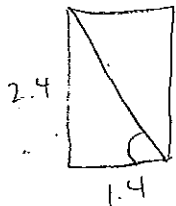
$$30^2 = 20^2 + x^2$$

$$x^2 = 30^2 - 20^2$$

$$\sqrt{x^2} = \sqrt{500}$$

$$x = 22.36 \text{ cm (2dp)}$$

4. A rectangular gate measures 2.4m by 1.4m. The gate is strengthened by diagonal wooden lengths. What angle will the diagonal beam make with the base length, to the nearest minute. 2

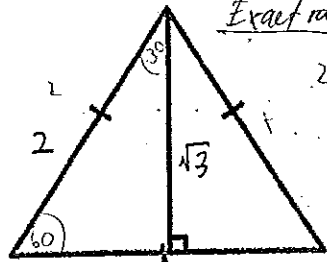


$$\tan \theta = \frac{2.4}{1.4}$$

$$\theta = \tan^{-1} \frac{2.4}{1.4}$$

$$= 59^\circ 45' \text{ (nearest minute)}$$

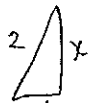
5. If all sides of an equilateral triangle are 2 cm, find the exact value of  $\sin 60$ . 2



Exact value =  $\sin 60 = \frac{\sqrt{3}}{2}$

Use the diagram above to label any angles or lengths. 2

- a) Find the perpendicular height of the triangle. 2



$$c^2 = a^2 + b^2$$

$$2^2 = 1^2 + b^2$$

$$b^2 = 2^2 - 1^2$$

$$\sqrt{b^2} = \sqrt{3}$$

$$b = \sqrt{3}$$

$$b = 1.73 \text{ (2dp) cm}$$

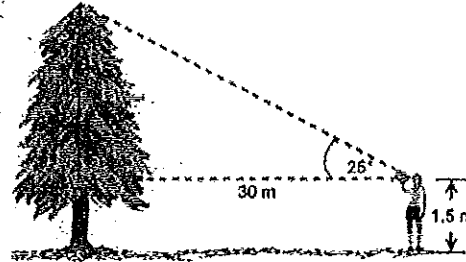
- b) Find the area of the triangle 2

$$A = \frac{1}{2} \times b \times h$$

$$= \frac{1}{2} \times 2 \times \sqrt{3}$$

$$= 1.732 \text{ cm (3dp)}$$

6. A sighting is taken to the top of the tree, standing 30m away on level ground. How tall is the tree? 2



$$\tan 25 = \frac{x}{30}$$

$$30 \tan 25 = x$$

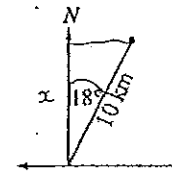
$$x = 13.98922974$$

$$\therefore \text{height} = x + 1.5$$

$$= 15.49 \text{ m (2dp)}$$

$$= 15.49 \text{ m (2dp)}$$

7. A rally driver drove 10km on a bearing of  $018^\circ$ . How far north did he travel, to 2 decimal places? 2



$$\cos 18 = \frac{x}{10}$$

$$10 \cos 18 = x$$

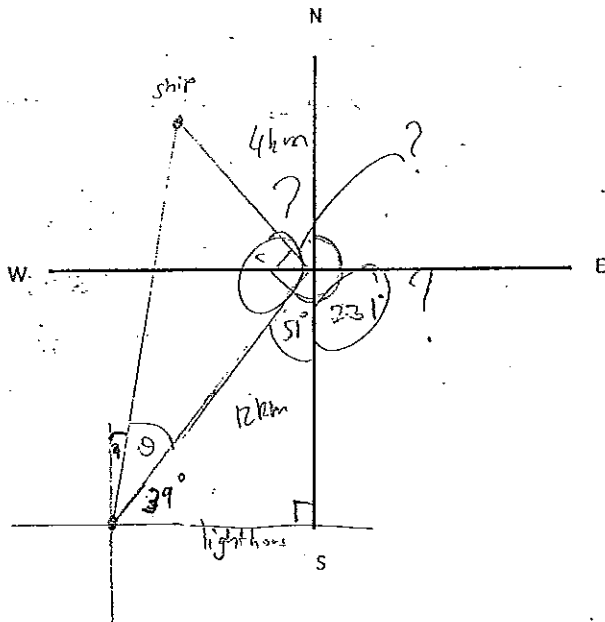
$$x = 9.51 \text{ km (2dp)}$$

8. A ship is 4 kms from a wharf on a bearing of  $321^\circ$ , and a lighthouse is 12 kms from the wharf on a bearing of  $231^\circ$ .

$321 - 231 = 90^\circ$

a) Show this information clearly on the axes below

3



b) Find the bearing of the ship from the lighthouse. (Answer correct to the nearest minute.)

2

$$\tan \theta = \frac{4}{12}$$

$$\theta = \tan^{-1} \frac{4}{12} \quad \checkmark$$

$$= 18.43494882 \approx 18^\circ 26'$$

$$\begin{aligned} & 2(18^\circ 26' 5.816'') + 51^\circ \\ &= 90 - 69.265816'' \\ &= 20^\circ 34' \end{aligned}$$

$$\begin{aligned} \theta &= \theta + 39^\circ \\ &= 18.43494882 + 39 \\ &= 57.43494882 \end{aligned}$$

$$90 - 57.43494882 = 32^\circ 34'$$

End of exam

3