Carlingford High School

Mathematics

Year 10 5.2 Course

Term 3 Exam

2016

Name: _____ Class: 10MA2 ___

Teacher (please circle): Mr Gong Mrs Pennington

Time allowed: **55 minutes**

- Calculators allowed.
- Show all necessary working.
- Complete the examination in blue or black pen.
- Attempt all questions.
- Extension questions are marked with an asterisk.

	Consumer Arithmetic	Statistics	Quadratics Inequalities	Trigonometry	Total
Standard	/14	/17	/13	/15	/59
Extension*	/2	/1	/4	/4	/11
Total	/16	/18	/17	/19	/70

Consumer Arithmetic

1(a) Calculate the simple interest on a loan of $50 000 at a rate of 5% p.a. invested for 3 years. [2 marks]

b. How much is owed altogether after the 3 years. [1]

2. Calculate the simple interest on $12 500 at 3% p.a. for 18 months. [2]

3. Use $A = P(1 + r)^n$ to calculate the interest on an investment of $6600 invested for 20 years at a rate of 3.5% p.a. compounded annually. [2]

4. Joe buys a car for $20 000. He is able to claim the amount that the car has depreciated on his tax return. If the car depreciates at 18% per year:

(a) How much depreciation can he claim after the first year? [1]

(b) How much is the car estimated to be worth after 4 years? [2]

***(c)** Joe always replaces his cars when they are valued at $4500. Calculate how many years it should take before the car first drops below this value. [2]

5. Davida purchases a furniture package valued at $5500. She pays 12.5% deposit and repays the remainder in 36 equal monthly instalments. Interest on the balance is charged at a flat rate of 14.5% p.a. Find the:

(a) Deposit Davida paid. [1]

(b) Interest charged on the balance. [1]

(c) Amount of each monthly instalment. [1]

(d) Total price Davida paid for the package. [1]

Statistics

6. The number of goals scored by the Carlingford soccer team in each game they played this season is given below.

2, 0, 0, 4, 2, 1, 1, 2, 3, 1, 3, 7, 4, 3, 1, 0, 4, 2

(a) Find the:

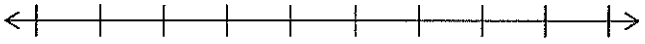
(i) Range [1]

(ii) Median [1]

(iii) Upper quartile [1]

(iv) Interquartile range [1]

(b) Draw a box and whisker plot for this data. [2]



7. The stem-and-leaf plot below shows the height of students in a Year 6 class.

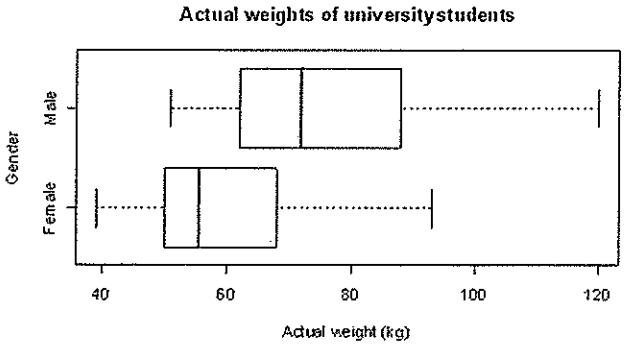
Stem	Leaf
11	0 0 1 1 1 2 2 2 3 8 9
12	2 2 2 5 6 8 9 9 9 9
13	1 2 5 6 8 8 8 8 8 9 9 9
14	0 0 1 2

(a) How many students are 129 cm tall? [1]

(b) What is the median height of the class? [1]

(c) What is the range of heights in the class? [1]

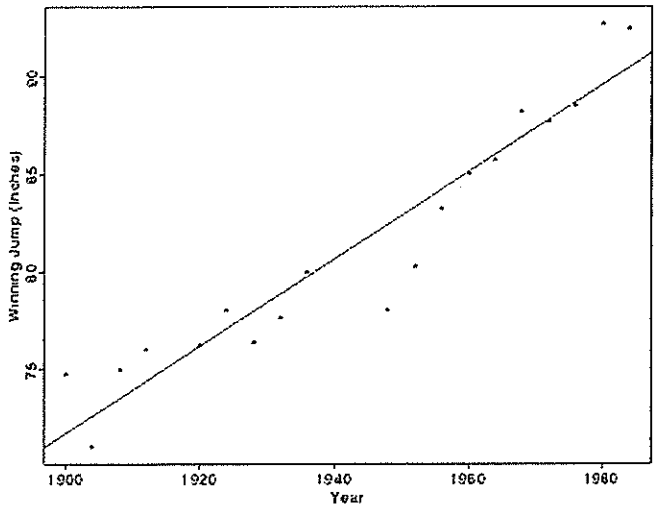
8. Use the given parallel box-and-whisker plot to answer the following questions.



(a) Find the approximate difference between the male and female medians. [1]

(b) Which group of students have the smaller measure of spread? [1]

9. For the following questions, refer to the scatter graph below.

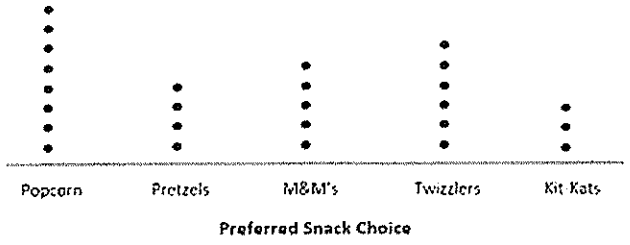


Circle the correct response:

(a) The *Year* is the **dependent/independent** variable? [1]

(b) The relationship between *Year* and *Winning Jump* is **positive/negative**? [1]

10. Year 10 were surveyed to find out what they ate at the movies. The results are shown in the graph below.



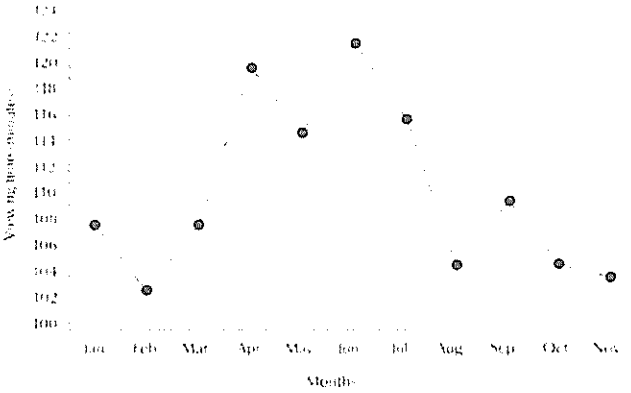
(a) What type of graph is this? [1]

_____

(b) Is this graph **symmetric**, **skewed** or **bimodal**? [1]

_____

10. The graph below shows how much time Jung watches TV each month.



(a) How many minutes did Jung watch TV in April? [1]

_____

(b) How many hours of television did Jung watch altogether over this 11-month period? [1]

_____

_____

***(c)** Jung appears to watch more television in the time between April and July. Give a possible reason for this. [1]

_____

_____

_____

_____

Quadratics and Inequalities

11. When $(x+4)(x-3)$ is expanded and simplified the result is: [1]

(Circle the A, B, C or D)

A $x^2+7x-12$
B $x^2+7x+12$
C x^2+x-12
D x^2+x+12

12. Expand and simplify the following:

(a) $(x+4)(x+6)$ [2]

(b) $(x-3)(x+6)$ [2]

(c) $(3x-2)^2$ [2]

***(d)** $(2x+4)(x^2-x-2)$ [2]

13. Factorise each of the following fully:

(a) x^2+5x+6 [1]

(b) $x^2-11x+24$ [1]

(c) $x^2-6x-27$ [1]

(d) x^2-25 [1]

(e) $x^2+12x+36$ [1]

(f) $(2x+4)(x-1)$ [1]

***(g)** $4x^2+12x-16$ [2]

Trigonometry

14. Evaluate correct to 2 decimal places:

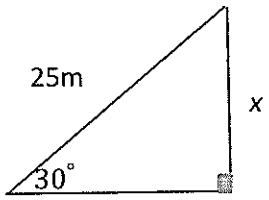
(a) $sin45° =$ _____ [1]

(b) $cos35°15' =$ _____ [1]

15. Evaluate $tan^{-1}(0.345)$ correct to the nearest minute. [1]

_____

16. Find the value of *x* place. [2]



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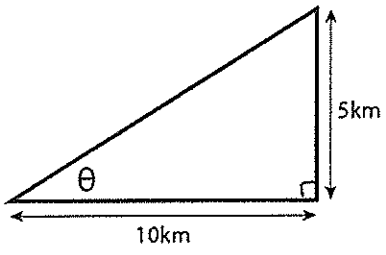
17. Find the value of θ correct to the nearest degree. [2]

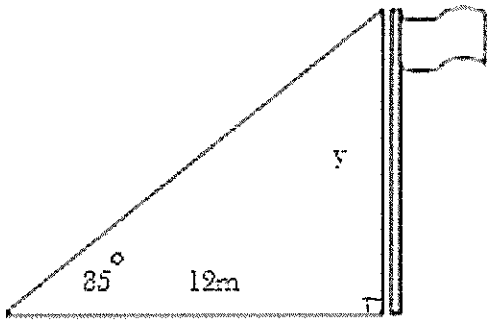


_____

_____

_____

18. Find the height of the flag pole correct to the nearest metre. [2]



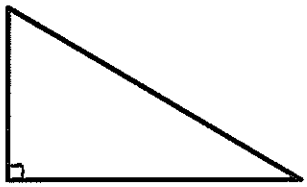
_____

_____

_____

19. A woman standing 8 metres from the base of a tree, sees a bird at the top of the tree at an angle of elevation of 45°15′.

(a) Show both measurements on the given diagram. [1]



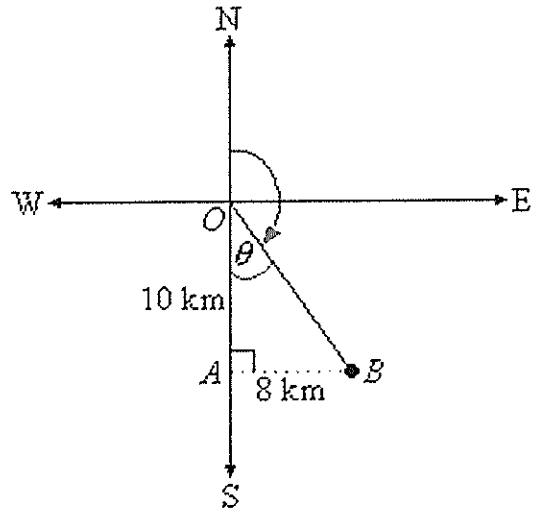
***(b)** How far is she from the bird? [2]
(Write your answer correct to 1 decimal place)

_____

_____

_____

20. A ship travels from point *O* to point *B*.

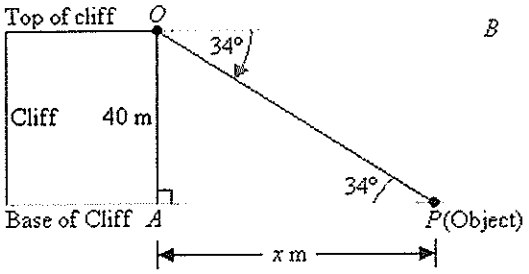


Use the given diagram to find:

(a) The value of θ, correct to the nearest degree. [2]

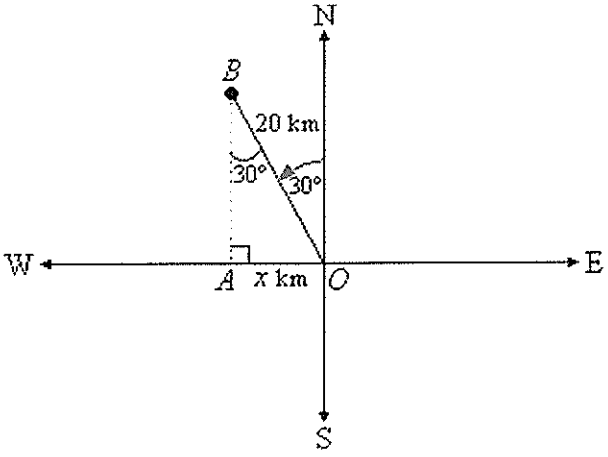
(b) The true bearing from *O* to *B*. [1]

***21.** A boat is viewed from the top of a cliff. The angle of depression is 34°.



How far from the base of the cliff is the boat is out at sea (correct to 1 d.p.)? [2]

22. A plane flies 20km from point *O* to point *B*.



How far west did the plane fly? [2]

THE END

Carlingford High School

Mathematics

Year 10 5.2 Course

Term 3 Exam

2016

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Time allowed: **55 minutes**

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Standard	/14	/17	/13	/15	/59
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Total	/16	/18	/17	/19	/70

Consumer Arithmetic

1(a) Calculate the simple interest on a loan of $50 000 at a rate of 5% p.a. invested for 3 years. [2 marks]

$50000 \times 0.05 \times 3$

$= \$7500$

b. How much is owed altogether after the 3 years. [1]

$\$50000 + \$7500 = \$57500$

2. Calculate the simple interest on $12 500 at 3% p.a. for 18 months. [2]

$\$12500 \times 0.03 \times 1.5$

$\$562.50$

3. Use $A = P(1+r)^n$ to calculate the interest on an investment of $6600 invested for 20 years at a rate of 3.5% p.a. compounded annually. [2]

$A = \$6600(1+0.035)^{20}$

$A = \$6600(1.035)^{20}$

$A = \$13132.61$

$I = 13132.61 - \$6600 = \$6532.61$

4. Joe buys a car for $20 000. He is able to claim the amount that the car has depreciated on his tax return. If the car depreciates at 18% per year: $A = P(1-r)^n$

(a) How much depreciation can he claim after the first year? [1]

$A = \$20000(1-0.18)^1$

$A = \$20000(0.82)$

$A = \$16400$

$\$20000 - \$16400 = \$3600$

(b) How much is the car estimated to be worth after 4 years? [2]

$A = \$20000(1-0.18)^4$

$A = \$20000(0.82)^4$

$A = \$9042.44$

***(c)** Joe always replaces his cars when they are valued at $4500. Calculate how many years it should take before the car first drops below this value. [2]

$\$4500 = \$20000(1-0.18)^n$

$= \$20000(0.82)^8$

8 years $= \$2748.96$ ~~4088.28~~

5. Davida purchases a furniture package valued at $5500. She pays 12.5% deposit and repays the remainder in 36 equal monthly instalments. Interest on the balance is charged at a flat rate of 14.5% p.a. Find the:

(a) Deposit Davida paid. [1]

$\$687.50$

(b) Interest charged on the balance. [1]

$\$5500 - \$687.50 = \$4812.50$

$I = 3 \times \$4812.50 \times 0.145 = \$697.81$ ~~$= \$2093.44$~~

(c) Amount of each monthly instalment. [1]

$\$4812.50 + \$2093.44 = \$6905.94$ ~~$\$697.81$~~

$\$6905.94 / 36 = \$191.83$ ~~$\$5510.31$~~

(d) Total price Davida paid for the package. [1]

~~$\$687.50 + \$5510.31$~~

~~$= \$6197.81$~~

$\text{Total} = \$687.50 + \$6905.94$

$= \$7593.44$

Statistics

6. The number of goals scored by the Carlingford soccer team in each game they played this season is given below.

2, 0, 0, 4, 2, 1, 1, 2, 3, 1, 3, 7, 4, 3, 1, 0, 4, 2

0 0 0 1 1 1 2 2 2 2 3 3 3 4 4 4 7

Q1 2 Q3

(a) Find the:

(i) Range [1]

7 - 0 = 7

(ii) Median [1]

$\frac{2+2}{2} = \frac{4}{2} = 2$

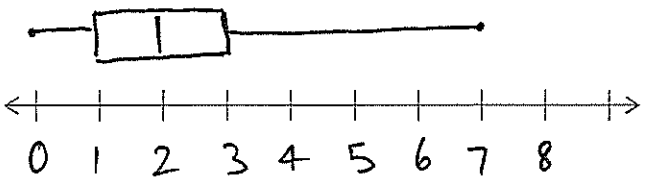
(iii) Upper quartile [1]

$Q_3 = 3$

(iv) Interquartile range [1]

$Q_3 - Q_1 = 3 - 1 = 2$

(b) Draw a box and whisker plot for this data. [2]



7. The stem-and-leaf plot below shows the height of students in a Year 6 class.

Stem	Leaf
11	0 0 1 1 1 2 2 2 3 8 9
12	2 2 2 5 6 8 9 9 9 9
13	1 2 5 6 8 8 8 8 8 9 9 9
14	0 0 1 2

(a) How many students are 129 cm tall? [1]

4

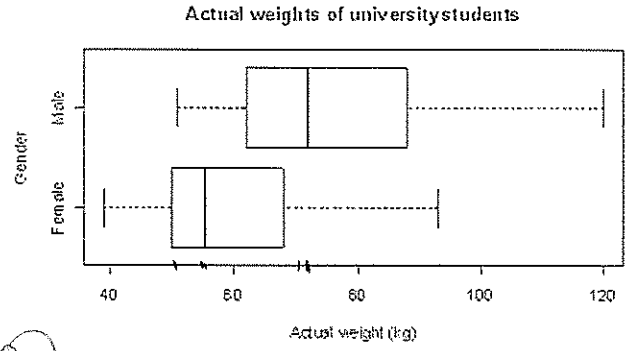
(b) What is the median height of the class? [1]

129

(c) What is the range of heights in the class? [1]

142 - 110 = 32 cm

8. Use the given parallel box-and-whisker plot to answer the following questions.



(a) Find the approximate difference between the male and female medians. [1]

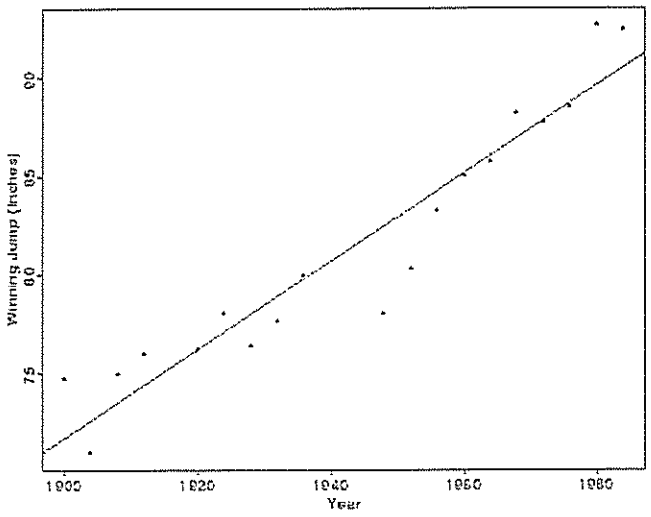
72 - 55 = 17

70 - 55 = 15

(b) Which group of students have the smaller measure of spread? [1]

Female

9. For the following questions, refer to the scatter graph below.

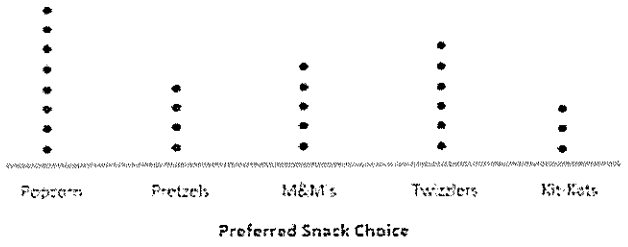


Circle the correct response:

(a) The *Year* is the **dependent**/**independent** variable? [1]

(b) The relationship between *Year* and *Winning Jump* is **positive**/**negative**? [1]

10. Year 10 were surveyed to find out what they ate at the movies. The results are shown in the graph below.



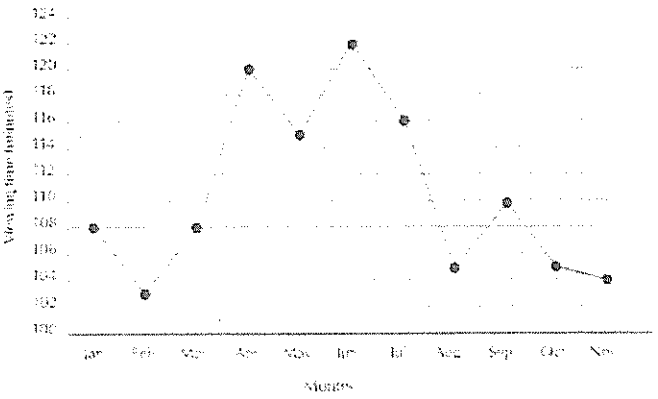
(a) What type of graph is this? [1]

Dot Graph

(b) Is this graph **symmetric**, **skewed** or **bimodal**? [1]

bimodal

10. The graph below shows how much time Jung watches TV each month.



(a) How many minutes did Jung watch TV in April? [1]

120

(b) How many hours of television did Jung watch altogether over this 11-month period? [1]

1216 ÷60 = 20 hours 16 mins
1214 mins /60 = 20.23hrs
= 20hrs 14min

*(c) Jung appears to watch more television in the time between April and July.
Give a possible reason for this. [1]

School Holidays

Quadratics and Inequalities

11. When $(x+4)(x-3)$ is expanded and simplified the result is: [1]

(Circle the A, B, C or D)

A $x^2+7x-12$
B $x^2+7x+12$
C x^2+x-12
D x^2+x+12

12. Expand and simplify the following:

(a) $(x+4)(x+6)$ [2]

$= x^2 + 4x + 6x + 24$

$= x^2 + 10x + 24$

(b) $(x-3)(x+6)$ [2]

$= x^2 - 3x + 6x = 18$

$= x^2 + 3x - 18$

(c) $(3x-2)^2$ [2]

$= (3x-2)(3x-2)$

$= 9x^2 - 6x - 6x + 4$

$9x^2 - 12x + 4$

*(d) $(2x+4)(x^2-x-2)$ [2]

$= 2x^3 - 2x^2 - 4x + 4x^2 - 4x - 8$

$= 2x^3 + 2x^2 - 8x - 8$

13. Factorise each of the following fully:

(a) x^2+5x+6 [1]

$6 \mid 3, 2$; $3 + 2 = 5$

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

(b) $x^2-11x+24$ [1]

$24 \mid -8, -3$; $-8 - 3 = -11$

$= (x-8)(x-3)$

(c) $x^2-6x-27$ [1]

$-27 \mid -9, 3$; $-9 + 3 = -6$

$= (x-9)(x+3)$

(d) x^2-25 [1]

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

(e) $x^2+12x+36$ [1]

$36 \mid 6, 6$; $6 + 6 = 12$

$= (x+6)(x+6)$

$= (x+6)^2$

(f) $(2x+4)(x-1)$ [1]

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

*(g) $4x^2+12x-16$ [2]

$= 4(x^2+3x-4)$

$-4 \mid 4, -1$; $4 - 1 = 3$

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

Trigonometry

14. Evaluate correct to 2 decimal places:

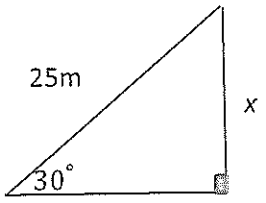
(a) $sin45° =$ 0.707 = 0.71 [1]

(b) $cos35°15' =$ 0.82 [1]

15. Evaluate $tan^{-1}(0.345)$ correct to the nearest minute. [1]

19°21'

16. Find the value of x place. [2]



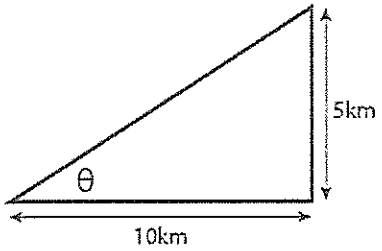
$\sin 30° = \frac{x}{25}$

$x = 25 \times \sin 30°$

$x = 25 \times 0.5$

$x = 12.5$

17. Find the value of θ correct to the nearest degree. [2]



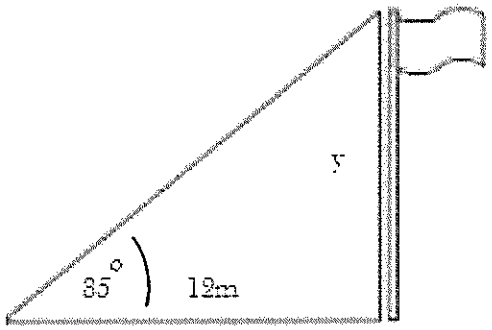
$\tan\theta = \frac{5}{10}$

$\tan\theta = \frac{1}{2}$

$\theta = \tan^{-1}(\frac{1}{2})$

$\theta = 27°$

18. Find the height of the flag pole correct to the nearest metre. [2]



$\tan 35° = \frac{y}{12}$

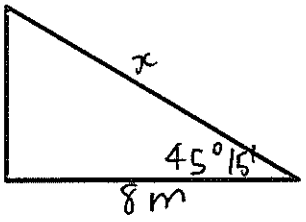
$y = 12 \times \tan 35°$

$y = 8.4$

$y = 8$ metres.

19. A woman standing 8 metres from the base of a tree, sees a bird at the top of the tree at an angle of elevation of 45°15'.

(a) Show both measurements on the given diagram. [1]



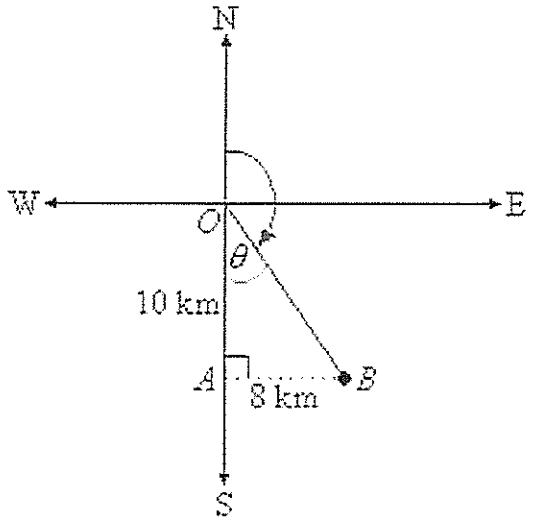
*(b) How far is she from the bird? [2]
(Write your answer correct to 1 decimal place)

$\cos 45°15' = \frac{8}{x}$

$x = 8 \div \cos 45°15'$

$x = 11.4$m

20. A ship travels from point *O* to point *B*.



Use the given diagram to find:

(a) The value of θ, correct to the nearest degree. [2]

$\tan\theta = \frac{8}{10}$

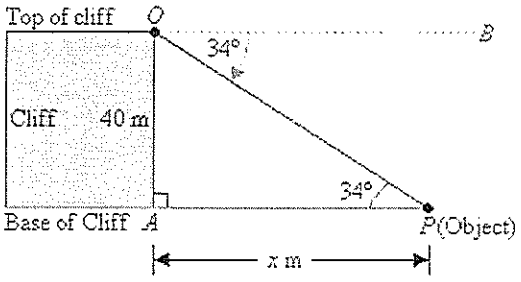
$\theta = \tan^{-1}(8/10)$

$\theta = 39°$

(b) The true bearing from *O* to *B*. [1]

$90° + 39° = 129°$

***21.** A boat is viewed from the top of a cliff. The angle of depression is 34°.



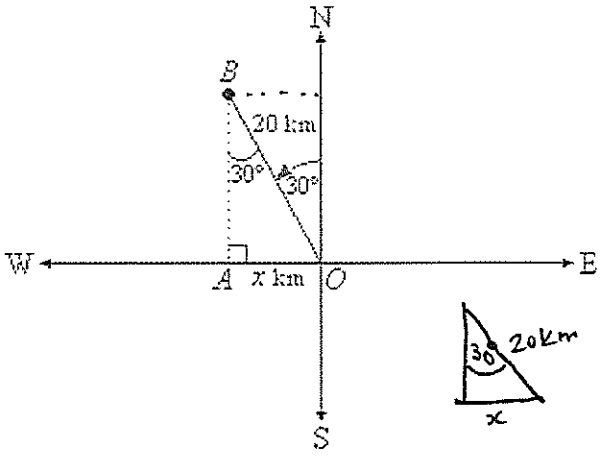
How far from the base of the cliff is the boat is out at sea (correct to 1 d.p.)? [2]

$\tan 34° = \frac{40}{x}$

$x = 40 \div \tan 34°$

$x = 59.3\text{m}$

22. A plane flies 20km from point *O* to point *B*.



How far west did the plane fly? [2]

$\sin 30° = \frac{x}{20}$

$x = 20 \times \sin 30°$

$x = 10\text{km}$

THE END