

Year 11 Foundations of Maths – Practice Exam 3

1. [2, 2, 2, 3 marks]

Solve each of the following to 2 decimal places where necessary.

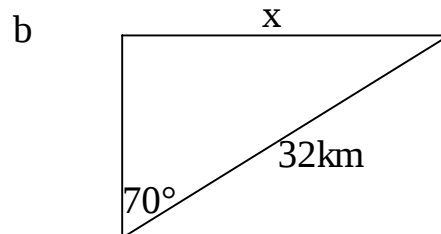
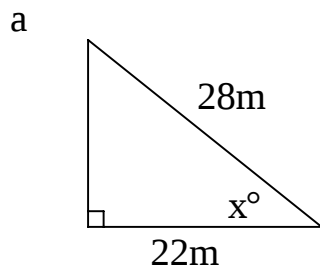
a. $4x - 2(3 - 2x) = 3(x + 4) - 2$ b. $2x = 5 - 3x^2$

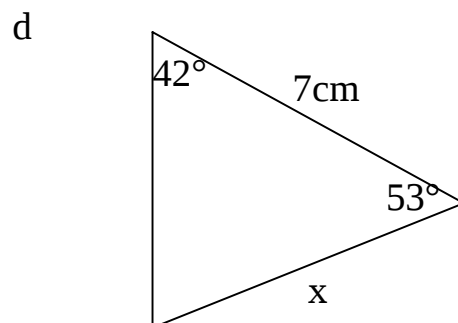
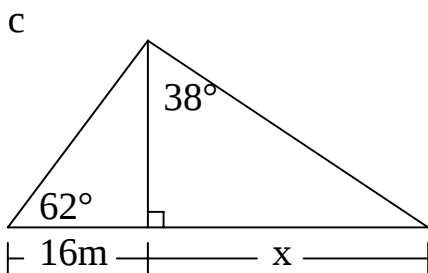
c. $4x - 3y = 26$
and
 $7 + y - x = 0$

d. $y = 7 - 2x$
and
 $xy = -5$

2. [1, 1, 2, 2 marks]

Solve for the value of x in each of the following triangles.



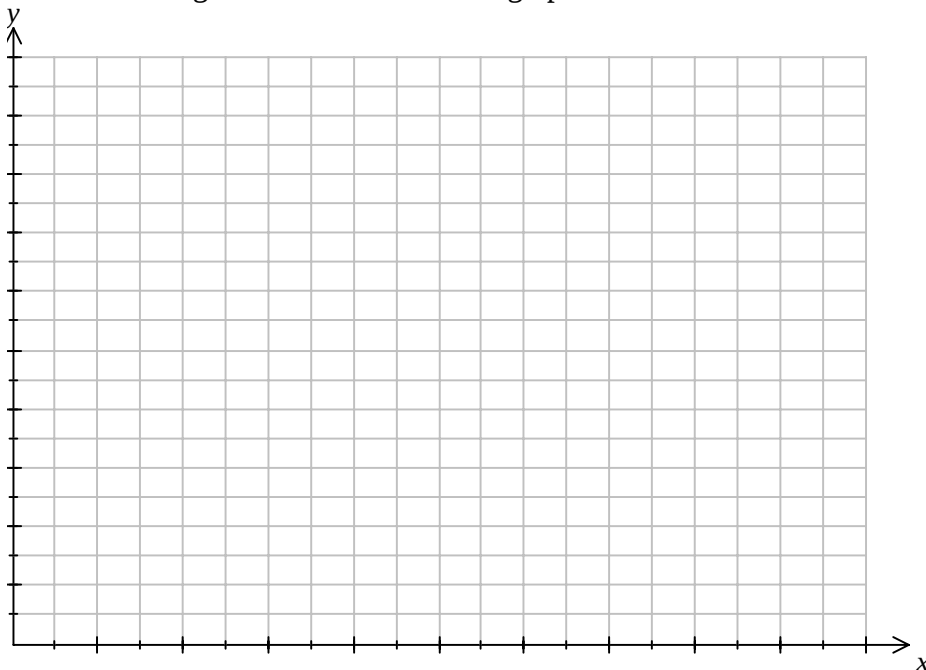


3. [4, 2, 2, 1, 1 marks]

A random sample of ten Foundations of Maths students was obtained and their first semester mark in the subject was compared with the number of sessions of mathematics they had missed during the semester.

Student Initials	AB	CD	EF	GH	IJ	KL	MN	OP	QR	ST
Sessions Absent	4	0	3	3	9	1	5	8	3	4
Semest. Mark %	66	81	75	63	48	74	69	56	70	60

a. On the grid below draw a scattergraph of the data.



- b. Describe the relationship between sessions absent and the semester mark.
- c. Draw in the line of best fit, on to the scattergraph above.
- d. Use the line of best fit to predict:
- (i) A semester mark for a student who missed 7 sessions.
 - (ii) the number of sessions absent for a student with a semester mark of 73%.

4. [5, 1, 1, 1 marks]

One hundred people were surveyed and asked whether they owned a computer and/or a mobile phone. Of these, 60 had a computer, 70 had a mobile phone and 20 had neither.

- a. Complete the two-way table below to show the information above.

	Owned Computer	Did Not Own Computer	Total
Owned Mob. Phone			
Did Not Own Mob. Phone			
Total			

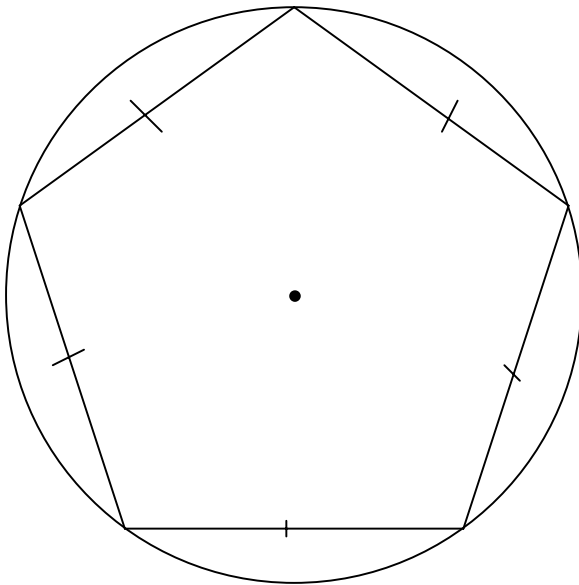
- b. How many people of those surveyed had a computer but not a mobile phone.
- c. What percentage of those surveyed had:
- (i) a computer and a mobile phone
 - (ii) a computer or a mobile phone

5. [5 marks]

In a high school, 20 students are to be selected for the student council. The school population consists of 140 Year 8 students; 125 Year 9s; 150 Year 10s; 125 Year 11s and 100 Year 12s. Determine the number of students to be selected from each year group for an accurate representation of the school population, **if no Year 8s are allowed on the student council?**

6. [4, 3, 3 marks]

A regular pentagon is inscribed within a circle of radius 7 cm.



Determine:

- a. the perimeter of the pentagon (to the nearest mm)

- b. the area of the pentagon (to 1 decimal place)

- c. the percentage of the area of the circle that lies within the pentagon (to one decimal place).

7. [1, 2, 3, 2, 2 marks]

a. Determine the equation of the line that has gradient of 2 and passes through the point (0, 6).

b. Determine the equation of the line with a gradient of $-\frac{3}{5}$ which passes through the point (10, 3). Write this equation in the form $ax + by = c$.

c. Given the point (p, 6) lies on the line in part (b) determine the value of p.

d. Determine the equation of the line perpendicular to the line in part (a) which passes through the point (0, -4).

e. Determine the equation of the line parallel to the line in (a) which passes through the point (1, 8).

8. [2, 3, 3 marks]

Claire decides to go hiking. Her first leg is on a bearing of 210° for 12 km. She stops for lunch and sets off again but on a bearing of 140° for 17km stopping again.

- Draw a diagram to represent Claire's hike.
- Determine the distance Claire is from her starting point (to the nearest 10m).
- Determine the bearing of her starting point from her second stop (to the nearest degree).

9. [5, 5 marks]

The weights of 80 brown trout released into the Warren River are given below.

Weight(g)	Frequency
100-110	8
110-120	12
120-130	30
130-140	20
140-150	10

a. By using midpoints of the intervals, calculate the following statistics to 1 decimal place, where necessary.

- (i) mean _____ (iv) range _____
- (ii) median _____ (v) Std. deviation _____
- (iii) mode _____

b. The weights of all fish were actually **5g** more because of an error in the electronic scales. Write down the new values of the statistics above.

- (i) mean _____ (iv) range _____
- (ii) median _____ (v) Std. deviation _____
- (iii) mode _____

10. [2, 2, 3 marks]

(For this question, use the radius of the Earth as 6 400 kms).

Find the distance between:

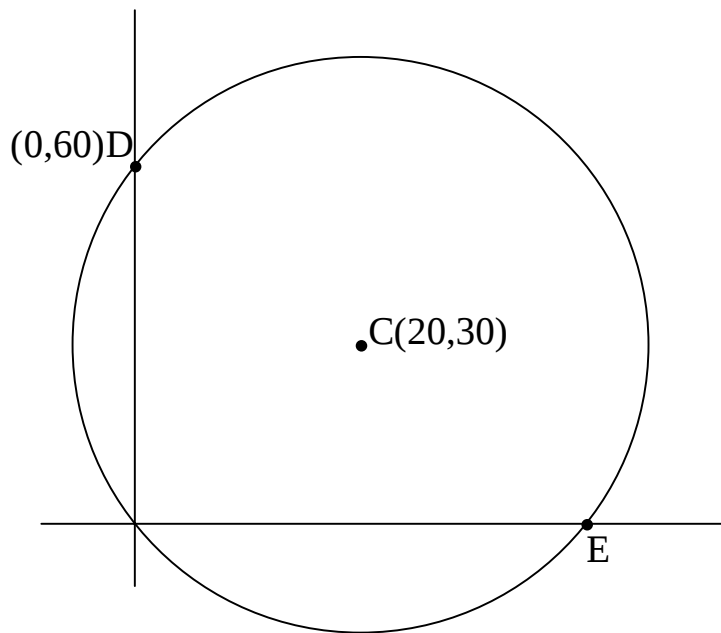
a. Port Hedland (21°S , 118°E) and Merredin (32°S , 118°E).

b. Kojonup(34°S , 117°E) and Esperance (34°S , 122°E)

c. Wanganui (40°S , 175°E) to Valdivar (40°S , 70°W)

11. [2, 1, 2 marks]

A radar tracking station is located at $C(20,30)$. A ship located at $D(0,60)$ is asked to confirm the coordinates of another ship located at E because its signal is not clear. DE is a diameter of the large region covered by the radar.



Determine:

- the coordinates of ship E
- the length of the diameter of the circular region
- the area covered by the radar tracking station

12. [2, 2 marks]

Two numbers have a difference of 8 whilst three times the larger added to twice the smaller totals 59.

a. Write down two simultaneous equations representing this situation.

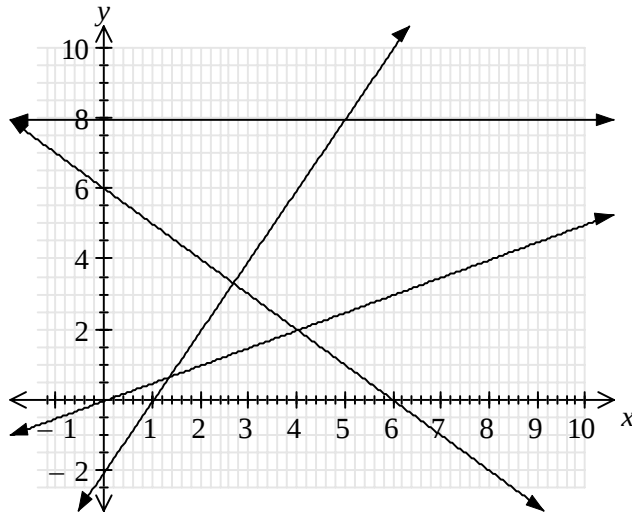
b. Hence, or otherwise find the two numbers.

13. [3 marks]

A person flying a kite holds the line 1 metre above level ground and has 45 metres of line out. Assuming the line is straight and makes 62° with the horizontal what is the height of the kite above ground level.

14. [4 marks]

Determine the equations of each of the straight lines shown below, labeling each one carefully.



15. [1, 2, 2 marks]

A salesperson is paid \$C per month where C is given by:

$$C = 1250 + 0.04S$$

\$S being the value of goods the salesperson sells in that month.

- How much does the salesperson get in a month that she sells \$35 000 worth of goods?
- What value of sales does the salesperson need to achieve in a month to receive \$5000 for that month?
- Interpret the meaning of the "1250" in the above formula.

16. [2, 2, 2 marks]

Consider the points A(-2, 1) and B(8, 9).

- a. Calculate the midpoint between the points A and B.
- b. Calculate the distance (in units) between A and B.
- c. Determine the equation of the straight line that goes through A and B.

17. [1, 1, 2, 2 marks]

Expand and simplify (where possible) the following expressions.

- a. $7(4x + 3)$
- b. $a(b - 6)$
- c. $(x + 1)(x - 2)$
- d. $(2x - 3)(x - 1)$

18 [1, 2, 3 marks]

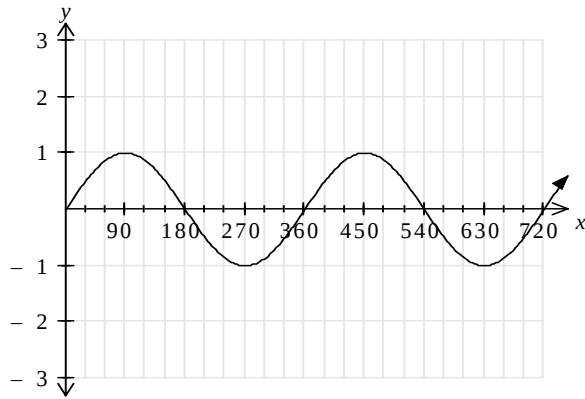
When an object is projected upwards from ground level, with initial speed 40m/s, the height it is above the ground t seconds later is h metres where h is given by: $h = 40t - 5t^2$

- a. Find the height above the ground when $t = 3$.
- b. Find the times when the height is 60 metres.
- c. State the value of h when the object hits the ground again and find the value of t then.

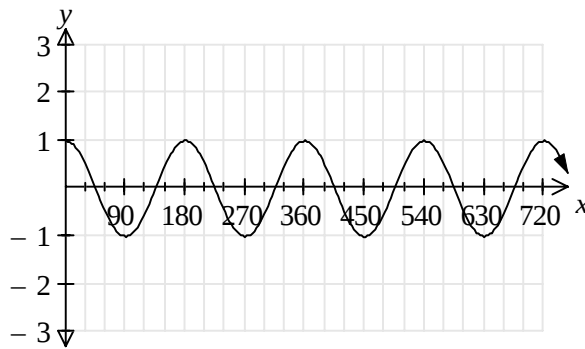
19. [2, 2, 3 marks]

Identify the trigonometric functions illustrated below.

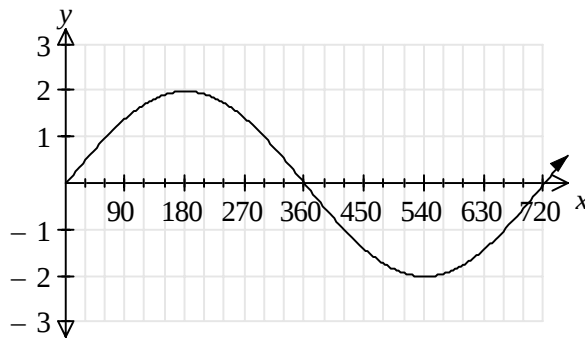
a.



b.



c.



20. [4, 3 marks]

A rectangular box measures 3m by 1.8m by 80cm. (Hint: A quick sketch may help.)

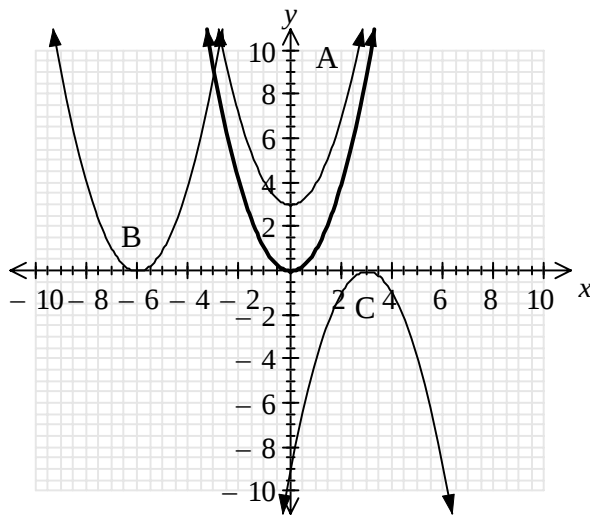
- a. What is the greatest length of wood that **will fit** into the box above?
- b. What angle would this piece of wood make with the base of the box?

21. [2, 2, 2 marks]

The equation shown in **bold** represents the relationship $y = x^2$.

All the other equations are of the form $y = (x - p)^2 + q$.

Determine the equations of the quadratics shown below.



A _____

B _____

C _____

22. [1, 1, 2, 1, 2 marks]

The profit (P) relates approximately to the number of sales representatives (n) using the formula: $P = -30n^2 + 600n - 1000$

- Determine the profit made using 8 sales representatives.
- Determine the profit made using 14 sales representatives.
- How many sales representatives should be operating for the profit to be maximized?
- What is the maximum profit?
- How much would be lost if there were no sales representatives?

23. [4 marks]

The test marks of three students Chris, Alice and Melanie were averaged with the result being 66. If Chris's mark is five less than Alice's and Melanie's mark is 1.5 times Alice's mark, find the marks for each of the three students.

24. [2, 2, 2, 2 marks]

A population of the rare Bower Bird is changing according to the relationship:

$$P = 490 \times 0.95^t$$

where P is the population of the bird and
 t is the number of years after the survey commenced.

- a. Is the population of the bird increasing or decreasing? Give a reason.
- b. What was the original population of Bower Birds (at the commencement of the survey)?
- c. What will be the population after 5 years?
- d. The Bower Bird will be placed on the endangered species list if the population ever falls below 100. After how many years will this happen?

25. [4 marks]

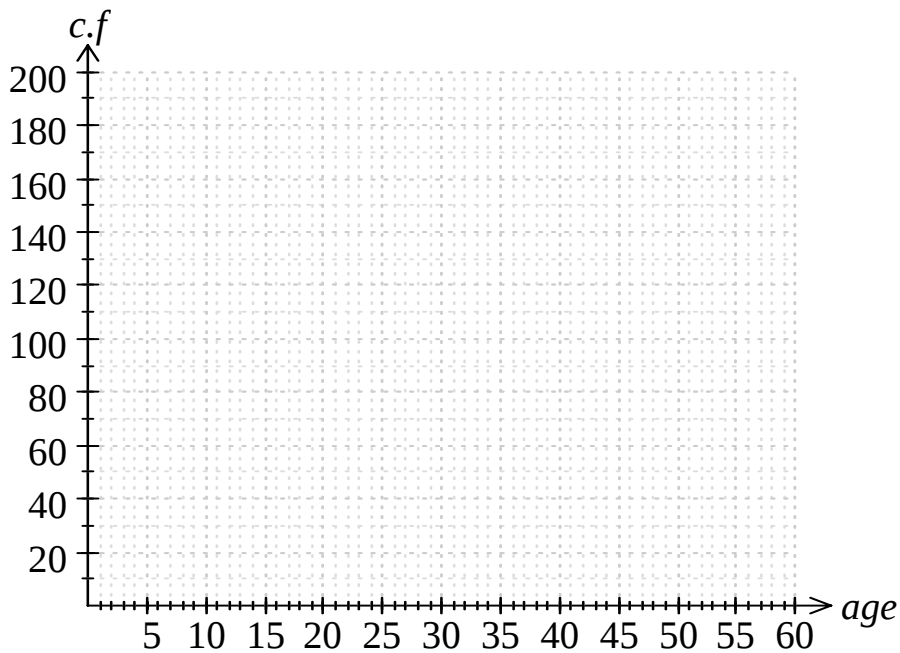
Two classes were given the same Economics test. The class with 21 students had a mean of 64% while the second class with 25 students had a mean of 80%. Find the mean of the combined classes.

26. [4, 4 marks]

The ages of students (in years) at a local TAFE college were collected and tabulated as follows:

Age (yrs)	No. of students
17 – 21	47
22 – 26	38
27 – 31	30
32 – 36	21
37 – 41	19
42 – 46	15
47 – 51	10

a. Draw a cumulative frequency graph on the grid provided below.



b. Use your graph to find:

- (i) The median age
- (ii) The percentage of students older than 33 years
- (iii) The age of the oldest student in the youngest 20% of students.

27 [2, 3, 2 marks]

A farmer had 4000 head of sheep on his property. An outbreak of foot and mouth disease infected the flock. The flock died off at a constant rate and after three weeks it was noted that there were 3280 sheep still alive.

- a. How many sheep died each week?

- b. Write an equation which would give the number of sheep alive knowing the number of weeks since the outbreak of the disease.
(Hint: ensure you define your variables clearly.)

- c. Use your equation from (b) to predict when the flock would no longer exist.

END OF EXAM