Student Name: _____ Teacher: _____

PENRITH SELECTIVE HIGH SCHOOL

MATHEMATICS DEPARTMENT

Yearly Exam
2018

Year 9 Mathematics

General Instructions :

- Working time – 75 minutes
- Write using black or blue pen.
- NESA approved calculators may be used.
- No correction tape/white out allowed.

Total marks – 60

- Attempt ALL questions
- All necessary working should be shown in each question.

Section	Mark
1: Revision	/21
2: Trigonometry Part 1	/10
3: Quadratics and parabolas Part 1	/9
4: Trigonometry Part 2	/11
5: Quadratics and parabolas Part 2	/9

Total	/60
%	

Section 1 – Revision (21 marks)

1) $\frac{3\sqrt{50}}{\sqrt{5}}$ is equivalent to:

A. $\frac{3\sqrt{50}}{5}$

B. $3\sqrt{10}$

C. $\frac{3\sqrt{250}}{25}$

D. $\frac{3\sqrt{50}}{25}$

2) Solve for x, given $2^{5x+1} = 4^3$.

A. $x = 1$

B. $x = \frac{7}{5}$

C. $x = 3$

D. $x = 0$

3) $\frac{5(y^{-1})^{-2}}{(x^3)^4}$ expressed in simplest form is:

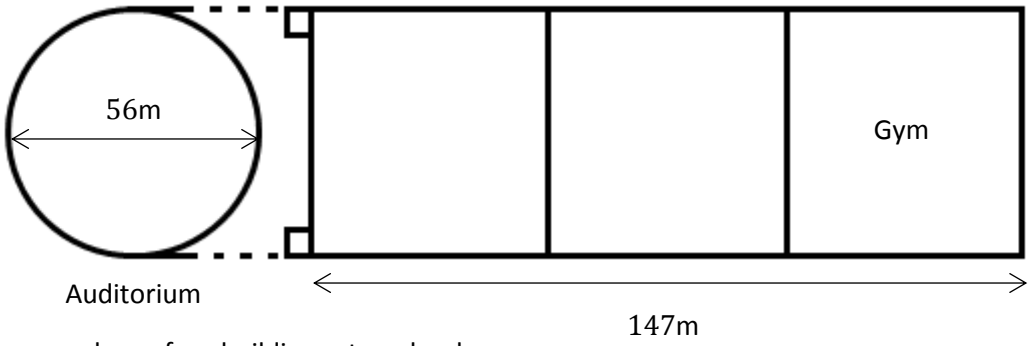
A. $\frac{5y^2}{x^{12}}$

B. $\frac{x^{12}y^2}{5}$

C. $5x^{12}y^2$

D. $\frac{5x^{12}}{y^2}$

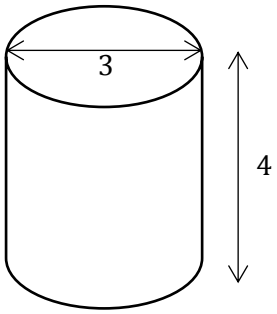
4)



The diagram shows four buildings at a school.
The diameter of the auditorium is 56m.
The three rectangular halls are equal in size and their total length is 147m.
Calculate the area of the gym.

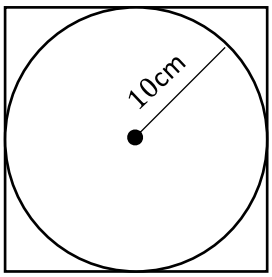
A. 1372m^2 B. 2744m^2 C. 8232m^2 D. 2401m^2

5) What is the surface area of the following cylinder? (expressed in exact form)



A. 18π units^2 B. 42π units^2 C. 15π units^2 D. 16.5π units^2

6) What is the area of the square?



A. 100cm^2

B. 40cm^2

C. 20cm^2

D. 400cm^2

7) The size of one interior angle for a regular octagon is:

A. $1080°$ B. $135°$ C. $1440°$ D. $180°$

8) Which of the following properties applies to a rhombus and square **only**?

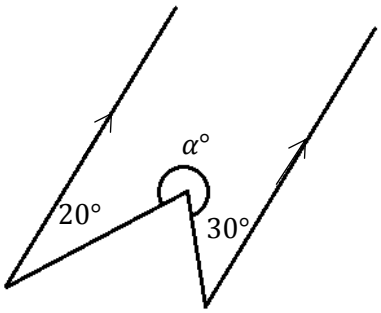
A. At least one pair of opposite sides are parallel.

B. Opposite sides are equal.

C. Diagonals bisect each other at $90°$.

D. Adjacent angles are supplementary.

9) The size of α is:



A. $300°$

B. $310°$

C. $50°$

D. $60°$

10) A lawyer's fee is \$250 for 7 hours of work. To calculate his earnings (E) over a period of time, he uses the formula:

$$E = \frac{250n}{7}$$

What does n represent?

A. The earnings per hour.

B. The earnings per day.

C. The number of days worked.

D. The number of hours worked.

11) A solution to an equation is $y = 50$. The question was:

A. $2y^2 = 2500$

B. $y = 9 \times 5 - 85$

C. $y^2 = \sqrt{30^2 \pm 40^2}$

D. $105 = \frac{11y}{10} + y$

12) The simplified form of $\frac{x^2+5x-6}{x^2+10x+24}$ is:

A. $\frac{x-1}{x-4}$

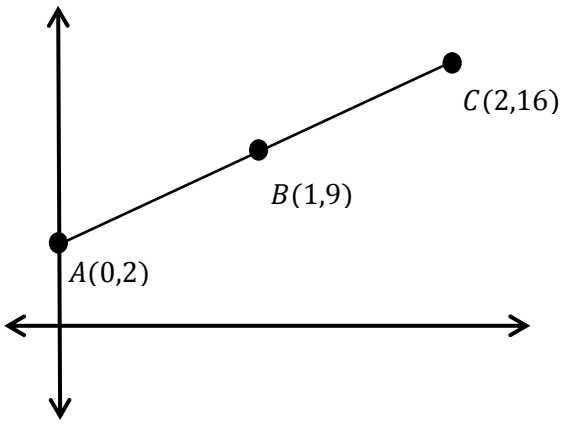
B. $\frac{x+1}{x-4}$

C. $\frac{x-1}{x+4}$

D. The expression cannot be simplified further.

13) Aryan uses the following table of values to produce the straight line below:

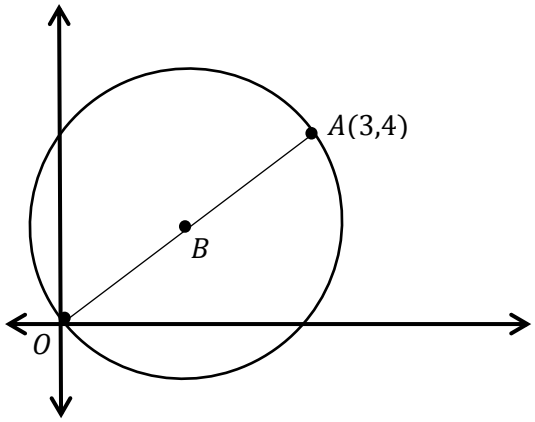
x	0	1	2
y	2	9	16



The point $D(7, n)$ also lies on this line, what is the value of n?

A. 49 B. 51 C. 56 D. 30

14) What are the coordinates for the point B where B is the midpoint of the diameter AO.



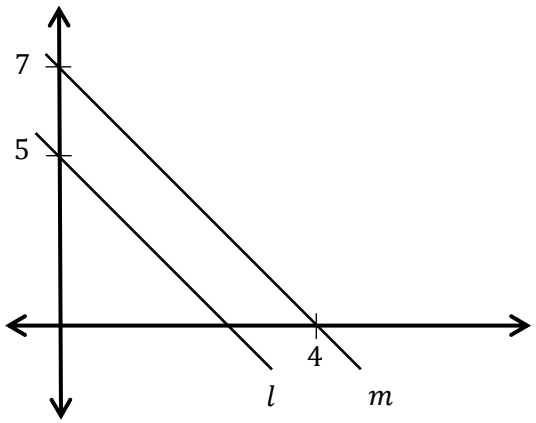
A. $(2, \frac{1}{2})$

B. $(\frac{1}{2}, 2)$

C. $(\frac{3}{2}, 2)$

D. $(2, \frac{5}{2})$

15) Given l and m are parallel, what is the equation of the line l in general form?



A. $4y - 7x - 20 = 0$

B. $4x - 7y + 20 = 0$

C. $7x + 4y - 20 = 0$

D. $7x - 4y + 28 = 0$

16) Which point satisfies both equations?

$$2x + 5y = 8$$
$$4x + 3y = 2$$

A) $(-1,2)$

B) $(1,-2)$

C) $(2,-1)$

D) $(-2,1)$

17) What value must be in the ☐ in order for the point $(2,3)$ to lie on both of the equations:

$$x + \square y = 11$$
$$\square x + 4y = 18$$

A. -3 B. 3 C. 2 D. -2

Questions **18** and **19** refer to the following stem-and-leaf plot of the ages of teachers and Penrith Selective High School:

Female Teachers		Male Teachers
2	3	4 6
4 2	4	2 2 5 6 8
8 8 5 4 0 0	5	3
9 4 3 3	6	3

18) How many modes does the data for the female teaching staff have?

A. 1

B. 2

C. 3

D. 4

19) What is the interquartile range (IQR) for the male teaching staff?

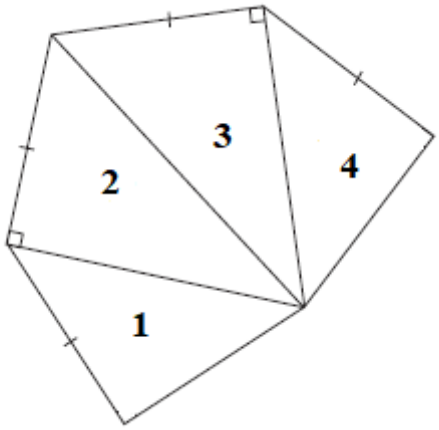
A. 11.5

B. 12

C. 12.5

D. 29

20) Which of the following statements is true?



A. Triangles 1 and 4 are congruent through the RHS test.

B. Triangles 2 and 3 are congruent through the RHS test.

C. Triangles 1 and 4 are congruent through the AAS test.

D. Triangles 2 and 3 are congruent through the AAS test.

21) Tax is calculated on:

A. Gross income.

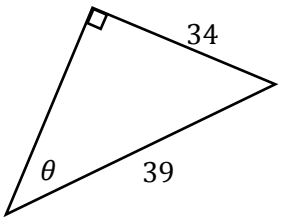
B. Income before deductions.

C. Income after deductions.

D. Fortnightly income.

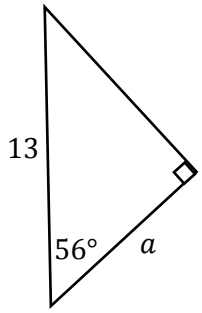
Section 2 – Trigonometry Part 1 (10 marks)

1) Find the angle θ, to the nearest degree. **2**

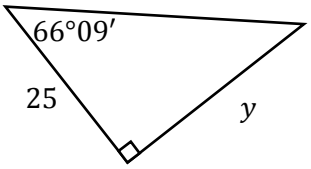


2) Find the value of the unknown side in each of the following, correct to 1 decimal place.

a) **1**



b) **1**



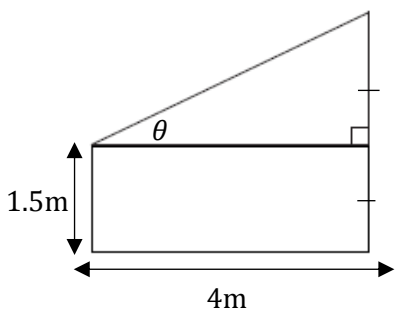
3) Tom walks 700m due east, then 1500m on a true bearing of $150°$.

a) Draw a clear diagram labelling all relevant angles and lengths. **2**

Start here→ ●

b) How far east is Tom from his starting position? **2**

4) Evaluate θ, correct to the nearest minute. **2**



Section 3 – Quadratics and parabolas Part 1 (9 marks)

1) Solve the following equations:

a) $2x^2 - 32 = 0$ **2**

b) $(x + 4)^2 - 1 = 0$ **2**

c) $2x^2 + 3x - 20 = 0$ **2**

2) In relation to the graph of $y = x^2$, describe the following graphs using the terms **reflected, wider** and **narrower.** **3**

a) $y = 3x^2$

The graph is _____ than $y = x^2$.

b) $y = \frac{1}{2}x^2$

The graph is _____ than $y = x^2$.

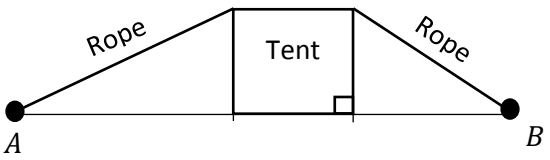
c) $y = -7x^2$

The graph is _____ and _____ than $y = x^2$.

Section 4 – Trigonometry Part 2 (11 marks)

1) A boat is 280m away from the base of a cliff that is 50m high. What is the angle of depression, from an observer on the edge of the cliff, to the boat? Answer to the nearest degree. **2**

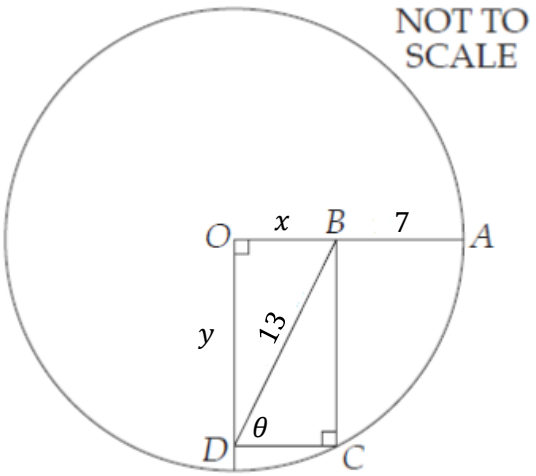
2) A tent is to be tied down by two ropes of varying length. The rope at point A is 20m from the base of the tent and the rope at point B is 15m from the base. If the rope at point A creates $20°$ with the ground, how much rope is needed altogether (not including the roof of the tent)? Answer to the nearest metre. **4**



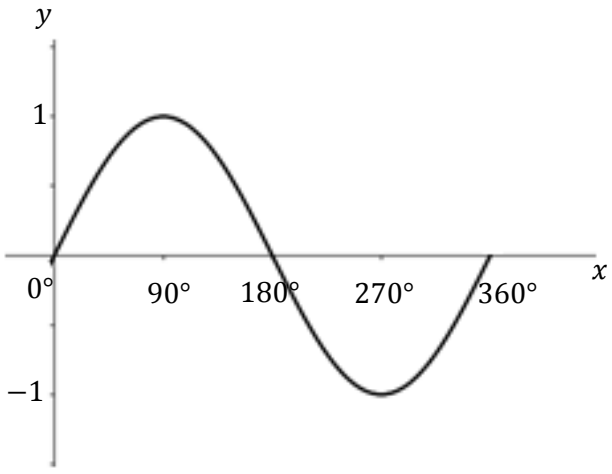
3) O is the centre of the circle with a radius OA. **4**

$OBCD$ is a rectangle.

Find the value of x, y and θ. Answer to the nearest whole number



4) What is the equation of the following graph:



A. $y = \sin(x)$

C. $y = -\sin(x)$

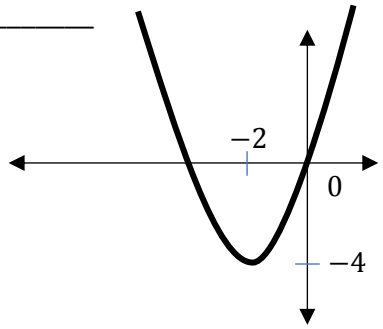
B. $y = \cos(x)$

D. $y = -\cos(x)$

Section 5 – Quadratics and parabolas Part 2 (9 marks)

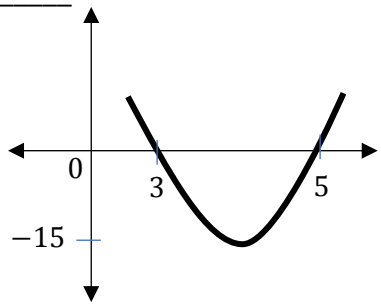
1) Match the graph to its corresponding rule by writing the appropriate letter in the space provided. **4**

i) _____



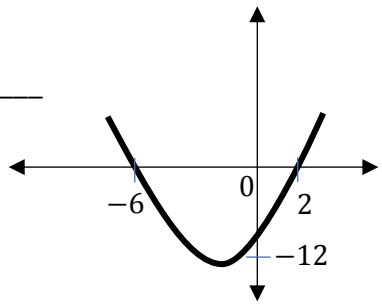
A. $y = (x - 3)(x - 5)$

ii) _____



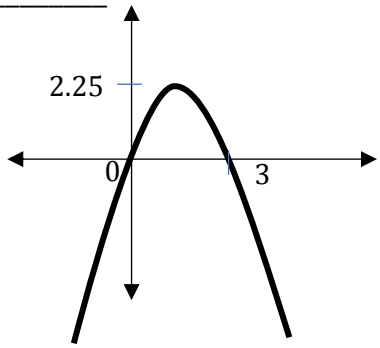
B. $y = -x^2 + 3x$

iii) _____



C. $y = (x + 2)^2 - 4$

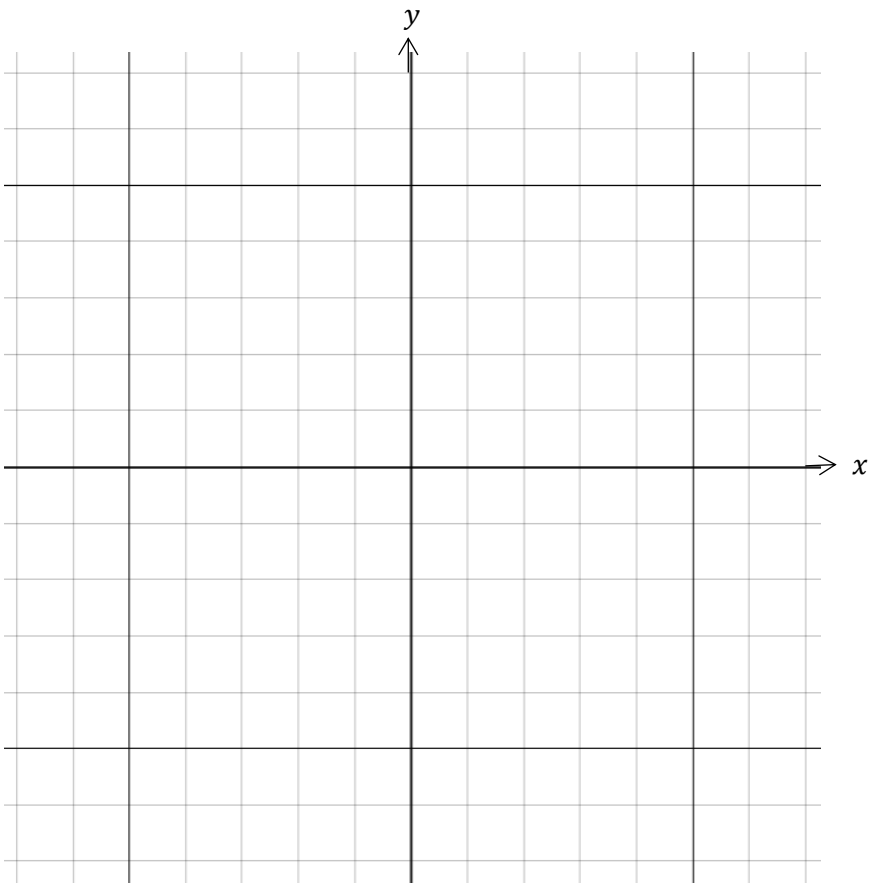
iv) _____



D. $y = x^2 + 4x - 12$

2) Sketch the graph of $y = -(x+3)^2 + 4$. Make sure the following features are clearly labelled: **5**

- x and y intercepts
- Turning point and its nature (minimum or maximum)
- Axis of symmetry



Student Name: _____ Teacher: _____

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

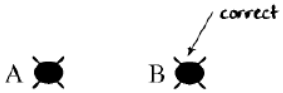
Sample: 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word correct and drawing an arrow as follows.



A ⊗ B ⊗ C ○ D ○

Start Here ➔

1.	A ○	B ○	C ○	D ○
2.	A ○	B ○	C ○	D ○
3.	A ○	B ○	C ○	D ○
4.	A ○	B ○	C ○	D ○
5.	A ○	B ○	C ○	D ○
6.	A ○	B ○	C ○	D ○
7.	A ○	B ○	C ○	D ○
8.	A ○	B ○	C ○	D ○
9.	A ○	B ○	C ○	D ○
10.	A ○	B ○	C ○	D ○
11.	A ○	B ○	C ○	D ○
12.	A ○	B ○	C ○	D ○
13.	A ○	B ○	C ○	D ○
14.	A ○	B ○	C ○	D ○
15.	A ○	B ○	C ○	D ○
16.	A ○	B ○	C ○	D ○
17.	A ○	B ○	C ○	D ○
18.	A ○	B ○	C ○	D ○
19.	A ○	B ○	C ○	D ○
20.	A ○	B ○	C ○	D ○
21.	A ○	B ○	C ○	D ○