

# YEAR 10 MATHEMATICS EXAMINATION

SEMESTER 1 2016

QUESTION AND ANSWER BOOKLET



**STUDENT NAME:**

**TEACHER:**

**DATE:**

## **TIME ALLOWED FOR THIS PAPER**

Reading time before commencing work: 10 minutes

Working time for this paper: 105 minutes

## **MATERIAL TO BE PROVIDED BY THE SUPERVISOR**

- This Question/Answer Booklet

## **MATERIAL TO BE PROVIDED BY THE CANDIDATE**

- Pen/pencil for answering questions
- Erasing stationery
- Up to two scientific calculators
- Written notes on **one** unfolded A4 sized paper; can be double-sided

**TOTAL QUESTIONS: 45**

**TOTAL MARKS: 125**

### **Section 1: Multiple choice**

**25 marks**

Attempt questions 1 - 25

### **Section 2: Written answer**

**100 marks**

Attempt questions 1 - 20

## **AT THE END OF THE EXAMINATION**

Attach any extra sheets used to this Question/Answer booklet.

## **IMPORTANT NOTE TO CANDIDATES**

**No other items may be taken into the examination room.**

**It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor BEFORE reading any further.**



**Section 1: Multiple choice (Total 25 marks, one mark per question)**

1. The simplified form of  $7ab + 2b - 5ab + b$  is:

- a)  $2ab + 2b^2$
- b)  $2ab + 3b$
- c)  $2ab + b$
- d)  $5ab$

2. The expanded form of  $2x(3x - 5)$  is:

- a)  $6x^2 - 5$
- b)  $6x - 10$
- c)  $6x^2 - 10x$
- d)  $5x^2 - 10$

3. The fully factorised form of  $8xy - 24y$  is:

- a)  $4y(2x - 6y)$
- b)  $8(xy - 3y)$
- c)  $8y(x - 24)$
- d)  $8y(x - 3)$

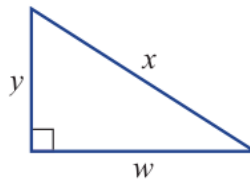
4.  $3x^3y \times 2x^5y^3$  is equal to:

- a)  $5x^{15}y^3$
- b)  $6x^{15}y^3$
- c)  $6x^8y^4$
- d)  $5x^8y^4$

5.  $12a^7 \div 4a^4$  simplifies to:

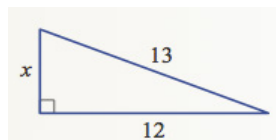
- a)  $3a^3$
- b)  $3a^{11}$
- c)  $8a^3$
- d)  $\frac{8}{a^3}$

6. Which of the following statements is true for the given diagram?



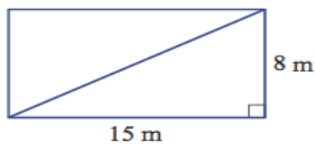
- a)  $y^2 - w^2 = x^2$
- b)  $x^2 - w^2 = y^2$
- c)  $y^2 - x^2 = w^2$
- d)  $w^2 - x^2 = y^2$

7. The value of x in the triangle shown is:



- a) 1
- b) 11
- c) 10
- d) 5

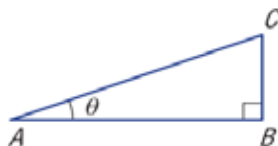
8. For the shape shown to be a rectangle, the length of the diagonal must be:



- a) 15 m  
b) 8 m  
c) 17 m  
d) 23 m
9. If  $\sin 40^\circ = \frac{6}{x}$ , then

- a)  $x = \frac{\sin 40^\circ}{6}$   
b)  $x = 6 + \sin 40^\circ$   
c)  $x = \frac{1}{6 \sin 40^\circ}$   
d)  $x = \frac{6}{\sin 40^\circ}$

10. Which side is adjacent to  $\theta$  in this triangle?



- a) AB  
b) AC  
c) BC  
d) Opposite

11. If 9 is subtracted from  $x$  and the result is 14, then the value of  $x$  is:

- a)  $x = 3$
- b)  $x = 5$
- c)  $x = 23$
- d)  $x = 25$

12. The solution to the equation  $2x + 5 = 17$  is:

- a)  $x = 6$
- b)  $x = 3$
- c)  $x = 4$
- d)  $x = 11$

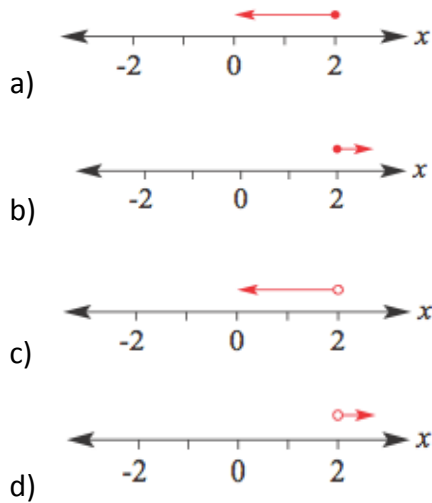
13. The solution to the equation  $5x - 12 = 6 - x$  is:

- a)  $x = 3$
- b)  $x = 1$
- c)  $x = -3$
- d)  $x = -1$

14. Solve the following inequality  $2m < 8$ :

- a)  $m > 5$
- b)  $m \geq 7$
- c)  $m < 4$
- d)  $m \geq 2$

15. Which number line shows  $x + 4 < 6$ ?



16. The solution to the equation :

$$\frac{x-9}{5} = 5$$

- a)  $x = 24$
- b)  $x = 34$
- c)  $x = 25$
- d)  $x = 16$

17. Expand and simplify  $(m - 4)(m + 4)$ :

- a)  $m^2 + 4m - 8$
- b)  $m^2 + 4m - 8$
- c)  $m^2 + 4m - 8$
- d)  $m^2 - 16$

18. Factorise the following by finding the highest common factor:

$$35ab^2 + 21ab$$

- a)  $14ab(2b + 1)$
- b)  $7ab(5b + 3)$
- c)  $35ab(7a + 3b)$
- d)  $35ab^2$

19. Expand and simplify  $(x + 4)^2$

- a)  $x^2 + 8x + 16$
- b)  $x^2 + 4x + 8$
- c)  $x^2 + 2x + 4$
- d)  $x^2 + 16$

20. When the expression  $(2x^4)^3$  is simplified, it becomes:

- a)  $2x^7$
- b)  $6x^{12}$
- c)  $2x^{12}$
- d)  $8x^{12}$

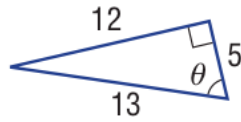
21. Simplify the following using the fifth index laws.

$$\left(\frac{m}{2}\right)^5$$

- a)  $\frac{m^3}{8}$
- b)  $\frac{m}{3}$
- c)  $\frac{m}{2}$
- d)  $\frac{m^2}{3}$



Questions **22** and **23** relate to the following right-angled triangle:



22. The value of  $\cos \theta$  in the diagram above is:

- a)  $\frac{13}{12}$
- b)  $\frac{5}{13}$
- c)  $\frac{12}{13}$
- d)  $\frac{5}{12}$

23. The value of  $\theta$  in the diagram above is:

- a)  $23^\circ$
- b)  $67^\circ$
- c)  $27^\circ$
- d)  $43^\circ$

24.  $3p^2q^3 \times 5pq^2$  simplifies to:

- a)  $8p^3q$
- b)  $15p^3q^5$
- c)  $5pq^2$
- d)  $35p^2q^3$

25. Simplify the following using index laws. Express your answer with positive indices.

$$\frac{3x^2y^4 \times 5xy^7}{12x^3y^5}$$

a)  $\frac{8xy^3}{12}$

b)  $\frac{15y^3}{4}$

c)  $\frac{5y^6}{4}$

d)  $\frac{xy^{13}}{12}$

## Section 2: Written answer (Total 100 marks)

1. Use words from the list below to complete the following sentences. 4 Marks

*Term Expression Coefficient Constant Term Equation Hypotenuse*

- a) A \_\_\_\_\_ is a group of numbers and pronumerals, connected by multiplication and division.
- b) The \_\_\_\_\_ is a numeral placed before pronumeral is multiplied by that factor.
- c) A \_\_\_\_\_ is a number with no attached pronumerals.
- d) An \_\_\_\_\_ is a group of mathematical terms containing no equals sign.

2. Write the following in index form: 3 Marks

a)  $3 \times 3 \times 3 \times 3 \times 3$

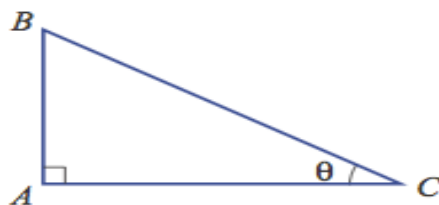
b)  $a \times a \times a$

c)  $5 \times m \times m \times m \times m$

3. Which side ( $AB$ ,  $AC$  or  $BC$ ) of these triangles is: (Label)

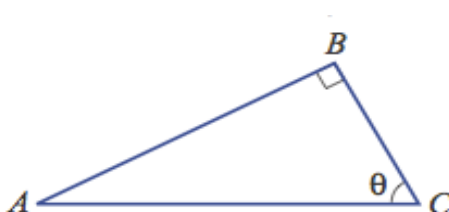
I - the hypotenuse  $\theta$ ? II - the opposite to  $\theta$ ? III - the adjacent to  $\theta$ ?

a)



3 Marks

b)



3 Marks

4. Simplify the following algebraic expressions:

8 Marks

a)  $-2ab \times 4bc$

b)  $6ab^2 \div 2ab$

c)  $x^0 + 4^0$

d)  $(x^2)^5 \times (x^2)^3$

5. Expand the following algebraic expressions and simplify where appropriate:

a)  $3(2x - 7)$

2 Marks

b)  $2(3x + 3) + 4(x + 5)$

2 Marks

c)  $(m + 2)(m + 5)$

2 Marks

6. Solve the following equations:

6 Marks

a)  $x + 5 = 20$

b)  $2x + 7 = 15$

c)  $4(x + 3) = 20$

7. Factorise the following by finding the highest common factor:

4 Marks

a)  $5t + 30$

b)  $4b^2 - 20ab$

8. Simplify each of the following expressions below. Leave your answers in index form. 4 Marks

a)  $h^9 \div h^4$

b)  $\frac{9x^8y^7}{3xy^3}$

9. Simplify the following using the index laws, and express using positive indices only. 4 Marks

a)  $\frac{a^3}{a^2} \times \frac{a^5}{a^2}$

b)  $\frac{2x^8y^7}{3a^2} \times \frac{6x^3y^3}{2a^2}$

10. Find the value of these expressions if  $x = 4$ ,  $y = -5$  and  $z = 2$ . 4 Marks

a)  $\frac{xy}{z}$

b)  $y^2 - 3xz$

11. Solve each of the following equations:

6 Marks

a)  $4x + 3 = 15$

b)  $8x - 15 = 5x + 6$

c)  $6(x + 3) = 21$

d)  $\frac{5x-3}{6} = 7$

12. Solve each of the following inequalities and then show each solution on a number line.

6 Marks

a)  $2a + 7 \geq 8$

b)  $5 - x > 3$



13. For each of the following statements, write an equation or inequality and solve for the pronumeral.

a) If  $x$  is added to 12, the result is 8.

2 Marks

b) If  $x$  is divided by 3 then 2 is added, the result is 8.

2 Marks

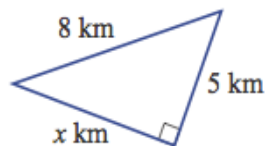
c) If a number,  $x$ , is multiplied by 3, the result is less than 9

2 Marks

14. Determine the value of  $x$  in these triangles using Pythagoras' theorem. Answer correct to two decimal places.

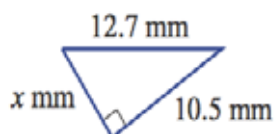
2 Marks

a)



b)

2 Marks





15. For the following right-angled triangle, write down the following ratios.

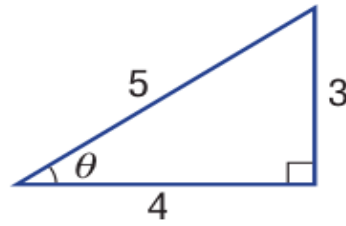
6 Marks

a)  $\sin \theta$

= \_\_\_\_\_

b)  $\cos \theta$

= \_\_\_\_\_



c)  $\tan \theta$

= \_\_\_\_\_

16. Factorise the following:

4 Marks

a)  $10xy + 16x$

b)  $-3x^2 - 27x$

17. Expand and simplify the following:

4 Marks

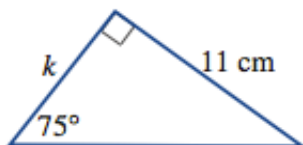
a)  $2(2x + 9) - 5$

b)  $4(3x + 4) - 3(x + 7)$

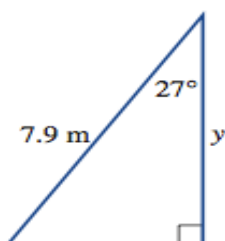
18. Find the value of the unknown length in these triangles. Round to two decimal places.

6 Marks

a)

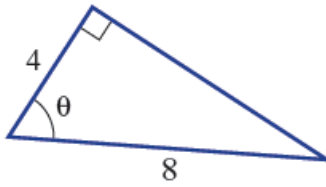


b)

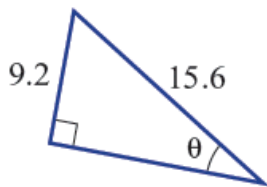


19 Find  $\theta$  in the following triangles, correct to the nearest degree where necessary. 6 Marks

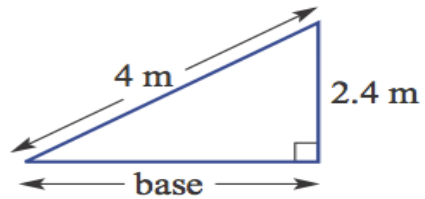
a)



b)



20 A city council wants to build a skateboard ramp 4 m long and 2.4 m high. How long should the base of the ramp be? 3 Marks



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**-- END OF EXAMINATION --**