

# IB Math Studies

## Topic 1 TEST Review Worksheet

### Numbers and Algebra

Show all your work whenever there are formulas and computations involved!

1. A problem has an exact value of  $x = 0.3479$ .

(a) Write down the exact value of  $x$  in the form  $a \times 10^k$ , where  $k$  is an integer and  $1 \leq a < 10$ .

$$3.479 \times 10^{-1}$$

(b) State the value of  $x$  correct to **two** significant figures

$$3.5 \times 10^{-1}$$

(c) Calculate the percentage error if  $x$  is given correct to **three** significant figures.

$$\frac{3.48 \times 10^{-1} - 3.479 \times 10^{-1}}{3.479 \times 10^{-1}} = .0028\%$$

2. A science teacher is writing a test for her Chemistry class. The test will have true and false questions worth 5 points each and multiple choice questions worth 10 points each for a total of 200 points. He wants to have twice as many multiple choice questions as true and false questions.

(a) Let **a** represent the number of true and false questions and **b** represent the number of multiple choice questions. Write a system of equations that represents the number of each type of question.

$$5a + 10b = 200$$

$$b = 2a$$

(b) How many true and false questions and how many multiple choice questions will be on the test?

$$8 \text{ TF and } 16 \text{ MC}$$

3. Convert the following...

(a) Convert 0.003854 metres to millimetres (mm). Give your answer to the nearest mm.

$$3.854 \text{ mm} \rightarrow 4 \text{ mm}$$

(b) Convert 1d 2h 23m to seconds

$$94980 \text{ sec}$$

(c) Convert  $1.5 \text{ dm}^2$  to  $\text{dam}^2$

$$.00015 \text{ dam}^2$$

(d) Convert  $2.36 \text{ m}^2$  to  $\text{mm}^2$

$$23600 \text{ mm}^2$$

(e) Convert  $3500000 \text{ mm}^3$  to  $\text{m}^3$

$$0.035 \text{ m}^3$$

4. The formula to convert from the kelvin scale to the Fahrenheit scale is

(a) Find the temperature for  $^{\circ}\text{F}$  for 300K.

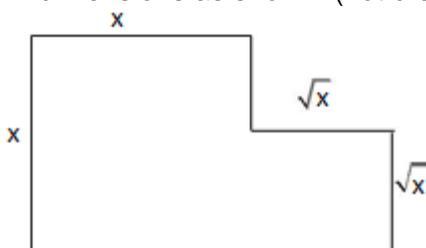
$$80.33^{\circ}\text{F}$$

(b) Find the temperature in K for  $100^{\circ}\text{F}$ . Give your answer to the nearest unit.

$$310.928\text{K}$$

(c)  $37.8^{\circ}\text{C}$

5. A swimming pool is to be built in the shape of a letter L. The shape is formed from two squares with side dimensions as shown. (not drawn to scale)



(a) Write down an expression for the area,  $A$ , of the swimming pool surface.

$$A = x + x^2$$

(b) The area, A, is to be  $56\text{m}^2$ . Write a quadratic equation that expresses this information.

$$56 = x + x^2$$

(c) Find both the solutions of your equation in part b.

$$X = -8\text{m}, 7\text{m}$$

(d) Which of the solutions in part c is the correct value of x for the pool? State briefly why you made this choice.

**7 m. You cannot have a side that measures a negative length.**

6. There is a rectangular field that is 1260m wide and 2500m long.

(a) Calculate the perimeter of the field. Give your answer in km.

$$7520\text{m}$$

The owner of the field, Enrico, wants to fence it. The cost of fencing is \$327.64 per km.

(b) Calculate the cost of fencing the field. Give your answer correct to two decimal places.

$$\$2463.85$$

Enrico estimates that the perimeter of the field is 7.6km. He uses this estimation to calculate the cost of fencing the field.

(c) Calculate the percentage error made by Enrico when using his estimation of perimeter of the field and calculate the cost of the fencing.

$$\frac{\$2490.06 - 2463.85}{2463.85} = 1.06\% \text{ error}$$

(d) Calculate the area of the field. Give your answer in square kilometres.

$$3.15\text{km}^2$$

7. (a) Given  $x = 3.7 \times 10^{-3}$  and  $y = 4.0 \times 10^6$ , calculate the value of  $w = x \cdot y$ . Give your answer in the form  $a \cdot 10^k$ , where  $1 \leq a < 10$  and  $k \in \mathbb{Z}$ .

(b) State to which of the following number sets  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$ ,  $\mathbb{R}$  each value belongs.

i. x

ii. y

iii. w

iv.  $x + y$

v.  $\frac{1}{w}$

(a)  $1.48 \times 10^4$

(b) (i)  $\mathbb{Q}$ ,  $\mathbb{R}$

(ii)  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$ ,  $\mathbb{R}$

(iii)  $\mathbb{N}$ ,  $\mathbb{Z}$ ,  $\mathbb{Q}$ ,  $\mathbb{R}$

(iv)  $\mathbb{Q}$ ,  $\mathbb{R}$

(v)  $\mathbb{Q}$ ,  $\mathbb{R}$

8. A teacher earns an annual salary of 45 000 USD for the first year of her employment. Her annual salary increases by 1750 USD each year.

(a) Calculate the annual salary for the fifth year of her employment. **\$52,000**

She remains in this employment for 10 years.

(b) Calculate the **total** salary she earns in this employment during these 10 years.

**\$528,000**

9. The seventh term,  $u_7$ , of a geometric sequence is 108. The eighth term,  $u_8$ , of the sequence is 36.

(a) Write down the common ratio of the sequence.  **$r = 1/3$**

(b) Find  $u_1$ . **78732**

The sum of the first  $k$  terms in the sequence is 118 096.

(c) Find the value of  $k$ .  **$k = 10$**

10. 10 000 people attended a sports match. Let  $x$  be the number of adults attending the sports match and  $y$  be the number of children attending the sports match.

(a) Write down an equation in  $x$  and  $y$ .  **$x + y = 10000$**

The cost of an adult ticket was 12 AUD. The cost of a child ticket was 5 AUD.

(b) Find the total cost for a family of 2 adults and 3 children. **39 AUD**

The total cost of tickets sold for the sports match was 108 800 AUD.

(c) Write down a second equation in  $x$  and  $y$ .  **$12x + 5y = 108800$**

(d) Write down the value of  $x$  and the value of  $y$ .  **$x = 8400, y = 1600$**

11. A classroom is to be built in the shape of a rectangle. The width is 3 metres less than the length and the area is  $28\text{m}^2$

a. If the length is  $x$  metres, write down an expression for the width  **$w = x - 3$**

b. Write a quadratic equation using the area of the rectangle  **$x^2 - 3x - 28 = 0$ .**

c. Find the length and width of the classroom. **The length is 7 metres and the width is 4 metres.**