

**SKH St. Simon's Lui Ming Choi Secondary School**  
**Form 3 Mathematics Unit 1 Laws of Indices**  
**Tiered Assignment**

Name: \_\_\_\_\_ Class: \_\_\_\_\_ ( ) Date: \_\_\_\_\_ Mark: \_\_\_\_\_

▶ **NOTES**

If  $m$  and  $n$  are integers and  $a, b \neq 0$ , then

1.  $a^m \cdot a^n = a^{m+n}$

2.  $\frac{a^m}{a^n} = a^{m-n}$

3.  $(a^m)^n = a^{mn}$

4.  $(ab)^n = a^n b^n$

5.  $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

6.  $a^{-n} = \frac{1}{a^n}$

7.  $a^0 = 1$

▶ **LEVEL 1**

1. Simplify  $\frac{a^{-7}}{(a^2)^4}$  and express your answer with positive index.

2. Simplify  $\frac{m^{-7}n^2}{m^4n^{-2}}$  and express your answer with positive indices.

3. Simplify  $\frac{x^{-4}}{(x^2y^{-3})^3}$  and express your answer with positive indices.

4. Simplify  $\frac{(m^2n^{-1})^{-2}}{n^5}$  and express your answer with positive indices.

 **LEVEL 2**

5. Simplify  $\frac{(2a^{-3}b)^4}{(4a^2b^{-5})^{-1}}$  and express your answer with positive indices.

**SKH St. Simon's Lui Ming Choi Secondary School**  
**Form 3 Mathematics Unit 2 Formulas**  
**Tiered Assignment**

Name: \_\_\_\_\_ Class: \_\_\_\_\_ ( ) Date: \_\_\_\_\_ Mark: \_\_\_\_\_

▶ **NOTES**

A formula is an equality relating two or more variables.

e.g.  $A = \frac{2}{3}B + 4$  is a formula and  $A$  is the subject of the formula.

We can make  $B$  to be the subject of the formula as follow:

$$A = \frac{2}{3}B + 4$$

$$A - 4 = \frac{2}{3}B$$

$$3(A - 4) = 2B$$

$$B = \frac{3(A - 4)}{2}$$

▶ **LEVEL 1**

1. Make  $a$  the subject of the formula  $5b = 3(2a + b)$ .

2. Make  $k$  the subject of the formula  $h = \frac{3+k}{2k}$ .

3. Make  $x$  the subject of the formula  $y - 2 = \frac{1}{2}(5y - 3x)$ .

4. Make  $n$  the subject of the formula  $\frac{6 + 5n}{2 - m} = 4n$ .

 **LEVEL 2**

5. Consider two formulas  $x = a + b$  and  $y = \frac{1}{2}(a - b)$ .

(a) Express  $b$  in terms of  $x$  and  $y$ .

(b) If  $x$  and  $y$  are both increased by 4, what is the change in the value of  $b$ ?

**SKH St. Simon's Lui Ming Choi Secondary School**  
**Form 3 Mathematics    Unit 3    Identities and Factorization**  
**Tiered Assignment**

Name: \_\_\_\_\_ Class: \_\_\_\_\_ (    )    Date: \_\_\_\_\_ Mark: \_\_\_\_\_

▶ **NOTES**

1. *Some Important Identities*

(a)  $a^2 - b^2 \equiv (a + b)(a - b)$

(b)  $a^2 + 2ab + b^2 \equiv (a + b)^2$

(c)  $a^2 - 2ab + b^2 \equiv (a - b)^2$

2. *Cross-method*

e.g. Factorize  $x^2 + x - 2$ .

$-2$  can be written as  $(+1)(-2)$  or  $(-1)(+2)$ .

We apply the cross-method as follows:

	1st trial	2nd trial
$x$	$+1$	$-1$
$x$	$-2$	$+2$
<hr style="width: 100%;"/>	$+x - 2x$	$-x + 2x$
	$= -x$	$= +x$

$\therefore x^2 + x - 2 = \underline{\underline{(x - 1)(x + 2)}}$

▶ **LEVEL 1**

1. Factorize

(a)  $9a^2 - 4b^2$ ,

(b)  $9a^2 - 4b^2 - 12a + 8b$ .

2. Factorize

(a)  $4m^2 - 16n^2$ ,

(b)  $4m^2 - 16n^2 - 4n + 2m$ .

3. Factorize

(a)  $x^2 + 10xy + 25y^2$ ,

(b)  $x^2 + 10xy + 25y^2 - 2x - 10y$ .

4. Factorize

(a)  $5x^2 - 125y^2$ ,

(b)  $5x^2 - 125y^2 - x + 5y$ .

▶ **LEVEL 2**

**5.** Factorize

**(a)**  $a^2 + 4a - 12,$

**(b)**  $(b^2 - b)^2 + 4(b^2 - b) - 12 .$

**SKH St. Simon's Lui Ming Choi Secondary School**  
**Form 3 Mathematics Unit 4 Percentages**  
**Tiered Assignment**

Name: \_\_\_\_\_ Class: \_\_\_\_\_ ( ) Date: \_\_\_\_\_ Mark: \_\_\_\_\_

▶ **NOTES**

1. *Percentage Change*

(a) 
$$\text{Percentage Change} = \frac{\text{new value} - \text{original value}}{\text{original value}} \times 100\%$$

(b) (i) If the original value is increased by  $x\%$ , then

$$\text{new value} = \text{original value} \times (1 + x\%)$$

(ii) If the original value is decreased by  $x\%$ , then

$$\text{new value} = \text{original value} \times (1 - x\%)$$

2. *Profit*

(a) 
$$\text{Profit per cent} = \frac{\text{profit}}{\text{cost price}} \times 100\% = \frac{\text{selling price} - \text{cost price}}{\text{cost price}} \times 100\%$$

(b) 
$$\text{Selling price} = \text{cost price} \times (1 + \text{profit per cent})$$

3. *Loss*

(a) 
$$\text{Loss per cent} = \frac{\text{loss}}{\text{cost price}} \times 100\% = \frac{\text{cost price} - \text{selling price}}{\text{cost price}} \times 100\%$$

(b) 
$$\text{Selling price} = \text{cost price} \times (1 - \text{loss per cent})$$

4. *Discount*

(a) 
$$\text{Discount per cent} = \frac{\text{discount}}{\text{marked price}} \times 100\% = \frac{\text{marked price} - \text{selling price}}{\text{marked price}} \times 100\%$$

(b) 
$$\text{Selling price} = \text{marked price} \times (1 - \text{discount per cent})$$

5. *Interest*

Let  $\$A$  be the amount,  $\$P$  be the principal,  $\$I$  be the interest,  $r\%$  be the interest rate per period and  $n$  be the number of periods.

(a) Simple interest

(i) 
$$I = P \times r\% \times n$$

(ii) 
$$A = P + I = P(1 + r\% \times n)$$

(b) Compound interest

(i) 
$$A = P(1 + r\%)^n$$

(ii) 
$$I = A - P = P[(1 + r\%)^n - 1]$$



 **LEVEL 1**

1. Tom earns \$12 000 a month and spends 60% of his salary on rent.
  - (a) How much does he spend on rent per month?
  - (b) If the monthly rent is increased by \$1500, what percentage of his salary is spent on rent?
  
2. It is known that Henry is 162 cm tall and Henry is shorter than Peter by 10%.
  - (a) Find the height of Peter.
  - (b) If John is taller than Henry by 10%, are John and Peter of the same height?  
Explain your answer.
  
3. A packet of candies is shared among three children Ada, Betty and Cindy. The number of Ada's candies is 25% more than that of Betty while the number of Betty's candies is 10% more than that of Cindy. It is given that Cindy has 240 candies.
  - (a) Find the total number of candies in the packet at the beginning.
  - (b) By what percentage is the number of Ada's candies more than that of Cindy's?

4. A hawker bought 80 apples for \$200. He sold 60% of the apples at \$4 each, 30% of the apples at \$2.5 each and the rest at \$2 each.
- (a) Find the total amount received from selling all the apples.
  - (b) Find the profit per cent.

 **LEVEL 2**

5. Sally wants to deposit \$9000 in a bank for 3 years.
- (a) If Bank *A* offers an interest rate of 5% p.a., compounded half-yearly, find the compound interest obtained by Sally after 3 years.  
(Give your answer correct to the nearest dollar.)
  - (b) It is known that the simple interest rate offered by Bank *B* is 5.5% p.a.. Which bank, *A* or *B*, should Sally deposit the money in order to get more interest after 3 years? Explain your answer.