

SKH St. Simon's Lui Ming Choi Secondary School
Form 2 Mathematics Tiered Assignment
Chapter 2 Identities and Factorization

Name: _____ Class: _____ () Date: _____

Level 1

1. $(a + b)(a - b) =$ _____

2. $(a + b)^2 =$ _____

3. $(a - b)^2 =$ _____

1. Prove that the equation $3(2x - 4) = 2(-6 + 3x)$ is an identity.

2. Determine whether each of the following equations is an identity.

(a) $(x + 1)(2x - 1) = 2x(x + 1) + (x - 1)$

(b) $2x(x - 1) - x - 5 = (2x - 5)(x + 1)$

3. If $(x - 2)(x + 5) \equiv x^2 + Px + Q$, where P and Q are constants, find P and Q .

4. Expand the following.

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

(b) $(6 - x)(6 + x)$

(c) $(7 + y)(7 - y)$

(d) $(2x + 7)(2x - 7)$

(e) $(3x - 4)(3x + 4)$

(f) $(4x + 5y)(4x - 5y)$

(g) $(k + 3)^2$

(h) $(1 + 7n)^2$

(i) $(m - 8)^2$

(j) $(3p + 1)^2$

(k) $(5m + 2n)^2$

5. Factorize the following expressions.

(a) $9c + 9d$

(b) $-ab - 2a$

(c) $3a + 2ab - ac$

(d) $3kx - 9ky - 15kz$

(e) $8a^3 + 20ab^2 - 12a$

(f) $24x^2y^3 - 40xy^3 - 56x^2y^2$

6. Expand the following.

(a) $(-4a - 3)(-4a + 3)$

(b) $(-h + 3k)(3k + h)$

(c) $2(3m - 1)(1 + 3m)$

(d) $3(3x + 5y)(3x - 5y)$

(e) $(3 - 2xy)(3 + 2xy)$

(f) $(4a + b^2)(4a - b^2)$

(g) $(-5 - y^3)(-5 + y^3)$

(h) $(mn - 4)(-mn - 4)$

(i) $(-3 - 5n)^2$

(j) $(-8a + 5b)^2$

(k) $3(2x - y)^2$

(l) $\left(x - \frac{y}{8}\right)^2$

7. Factorize the following expressions.

(a) $3m^2n + m^2 - 3n^2 - n$

(b) $4p^2 - 3q - 2pq + 6p$

(c) $-12x^2 - 4xy - 18x - 6y$

8. Without using a calculator, find the values of the following expressions.

(a) $77^2 - 23^2$

(b) 298×302

9. Without using a calculator, find the values of the following expressions.

(a) 205^2

(b) 47^2

Level 2

10. Factorize the following expressions.

(a) $2ax + 4bx - 2cx + ay + 2by - cy$

(b) $8ax + 6bx - 4ay - 3by + 12a + 9b$

11.

(a) Expand $(x + 3y)^2$.

(b) Hence, expand $(x + 3y - 2)(x + 3y + 2)$.

12. Expand the following.

(a) Expand $(2x + 9y)(2x - 9y)$.

(b) Using the result of **(a)**, expand $\left(\frac{2x}{3} + 3y\right)\left(\frac{x}{3} - \frac{3y}{2}\right)$.

13. If $(x + 3M)(2x - 1) + 4 \equiv x(2x - 7) + N$, where M and N are constants, find M and N .

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Form 2 Mathematics Tiered Assignment
Chapter 3 Formulae

Name: _____ Class: _____ () Date: _____

Level 1:

1. Simplify

(a) $\frac{4a^2b^3}{2ab}$

(d) $\frac{8b-2a}{a^2-4ab}$

(b) $\frac{8m-12m^2}{12mn}$

(e) $\frac{yx-2x+y-2}{y-2}$

(c) $\frac{15ax-3ay}{20bx-4by}$

2. Simplify

(a) $\frac{4m}{n} \times \frac{5n}{8m}$

(b) $\frac{q}{5p} \div \frac{q^2}{10}$

(c) $\frac{8m^4}{r} \times \frac{n}{16m} \div \frac{3n}{r^2}$

(d) $\frac{bm-bn}{ax} \times \frac{3c^2}{cn-cm}$

3. Simplify

(a) $\frac{5n}{3m} + \frac{n}{3m}$

(b) $\frac{6x}{3x-4y} - \frac{8y}{3x-4y}$

(c) $\frac{4}{5n} - \frac{1}{m}$

(d) $\frac{2y}{3x} + \frac{y}{2x} - \frac{11y}{12x}$

(e) $\frac{2m}{3m-4n} - \frac{n}{2(4n-3m)}$

(f) $1 + \frac{1-4y}{3y}$

(g) $\frac{6x}{2x+5y} - 2$

4. Given that $T = t + 273.15$, find the value of T if $t = 32$.
5. Consider the formula $Q = y^4$. If $y = 3$, find Q .
6. Consider the formula $y = \frac{x(x+1)}{2}$. If $x = -11$, find y .
7. Given that $v^2 = u^2 + 2as$, find the value of a if $v = 20$, $u = 10$ and $s = 15$.

8. Consider the formula $y = kx + b$. If $y = 17$, $k = -3$ and $b = 5$, find x .

9. Change the subject of each of the following formulae to the letter in the square brackets.

(a) $K = 2pt$

[p]

(b) $5 + \frac{x}{y} = z$

[x]

10. Make y the subject of the formula $y - c = m(6 - y)$.

Level 2:

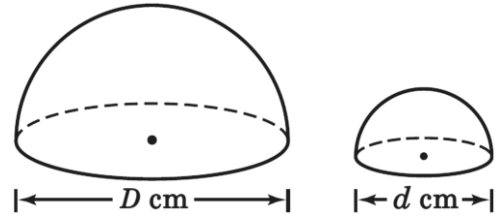
11. Simplify

(a) $\frac{3}{a-2b} + \frac{2}{2b-a}$

(b) $\frac{2x}{2x-1} - \frac{x}{x+3}$

12. The perimeter P m of a regular n -sided polygon of side a m can be calculated by the formula $P = na$. What is the length of a side of a pool in the shape of a regular octagon of perimeter 40 m?

13. A pack consists of two pieces of chocolate in the shape of hemispheres as shown below. The diameters of their bases are D cm and d cm respectively. The total volume V cm³ of chocolate in the pack can be calculated by the formula $V = \frac{1}{12} \pi(D^3 + d^3)$. If $D = 4$ and $d = 2$, is 50 cm³ of chocolate enough to make 3 such packs? Explain your answer. (Take $\pi = 3.14$.)



14. Make x the subject of the formula $\frac{1}{x} + \frac{2}{y} = \frac{r}{s}$.

15. The length, the width and the height of a gold brick in the shape of a rectangular block are ℓ cm, w cm and h cm respectively. The weight M g of the gold brick can be calculated by the formula $M = 19.3\ell wh$.

(a) Express h in terms of M , ℓ and w .

(b) It is known that a gold brick in the shape of a rectangular block weighs 900 g. If its length is 12 cm and its width is 5 cm, what is the height?

(Give the answer correct to the nearest 0.1 cm.)

16. The size of each interior angle, I , of an n -sided regular polygon can be obtained by the formula $I = \frac{(n-2) \times 180^\circ}{n}$.

(a) Make n the subject of the formula.

(b) How many sides does a regular polygon have if each of its interior angles is 120° ?

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Form 2 Mathematics Tiered Assignment

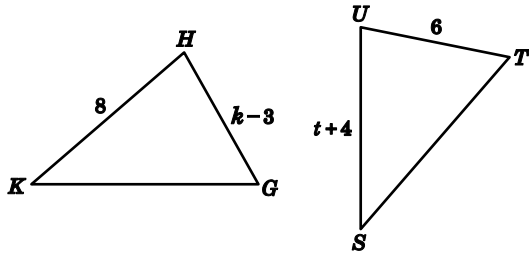
Chapter 5 Congruence Chapter 8 Similarly

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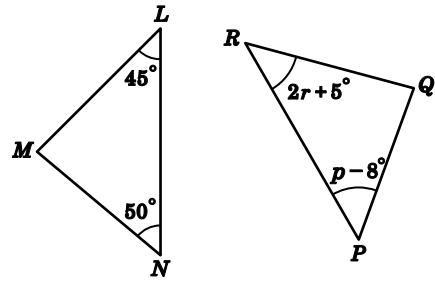
Level 1

Find the unknowns in each of the following pairs of congruent triangles. [Nos. 1-2]

1. $\triangle HKG \cong \triangle UST$

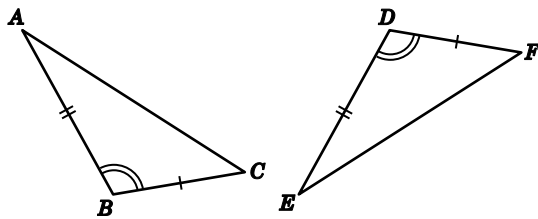


2. $\triangle MLN \cong \triangle QRP$

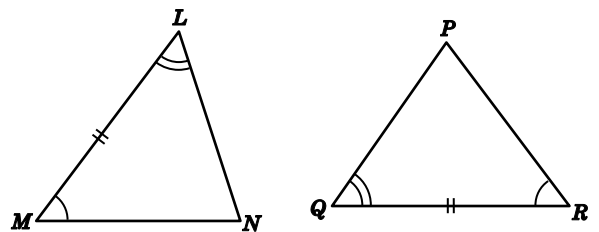


Prove that the following pairs of triangles are congruent. [Nos. 3-4]

3.

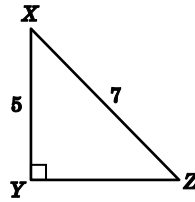
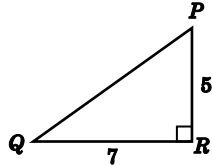
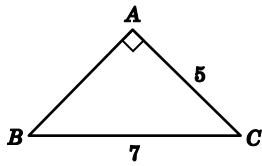


4.



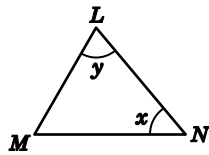
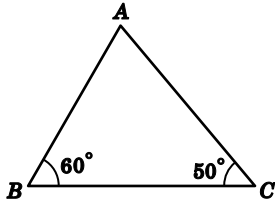
Determine which two triangles must be congruent and give a reason to explain your answer.

5.

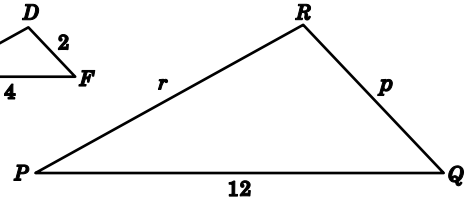
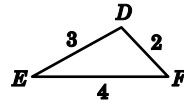


Find the unknowns in each of the following pairs of similar triangles. [Nos. 6-7]

6. $\triangle ABC \sim \triangle LMN$

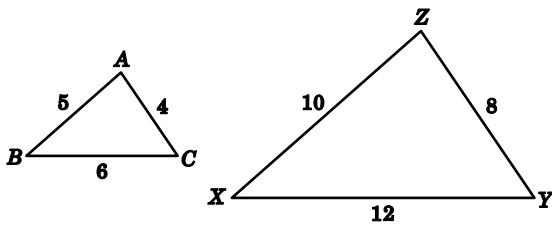


7. $\triangle DEF \sim \triangle RPQ$

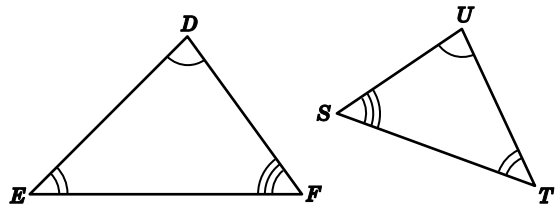


Prove that the following pairs of triangles are similar. [Nos. 8-9]

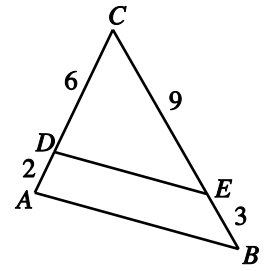
8.



9.



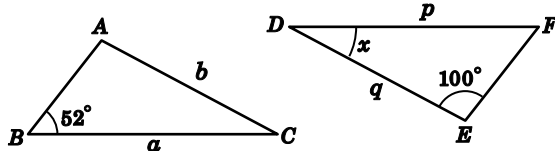
10. In the figure, CDA and CEB are straight lines. Prove that $\triangle ABC \sim \triangle DEC$.



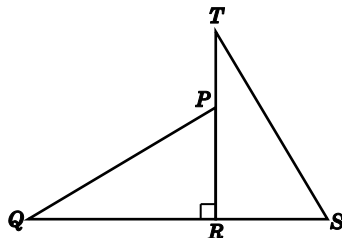
Multiple Choice Question

11.	12.	13.
14.	15.	16.

11. In the figure, $\triangle ABC \cong \triangle EFD$. Which of the following must be true?

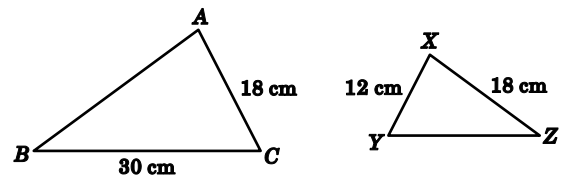


- A. $a = b, p = q, x = 28^\circ$
 B. $a = b, p = q, x = 52^\circ$
 C. $a = p, b = q, x = 28^\circ$
 D. $a = p, b = q, x = 52^\circ$
12. In the figure, $\triangle PQR \cong \triangle STR$. Which of the following may not be true?



- A. $\angle Q = \angle T$
 B. $\angle TRS = 90^\circ$
 C. $PR = SR$
 D. $QR = ST$

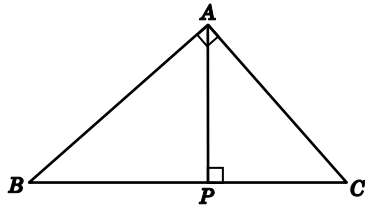
13. In the figure, $\triangle ABC \sim \triangle XZY$. Find AB and YZ .



- A. $AB = 12$ cm, $YZ = 20$ cm
 B. $AB = 12$ cm, $YZ = 30$ cm
 C. $AB = 27$ cm, $YZ = 20$ cm
 D. $AB = 27$ cm, $YZ = 30$ cm
14. It is given that $\triangle ABC \sim \triangle RQP$. $AB = 10$, $PQ = 20$ and $5AC = 2RP$. Which of the following must be true?

- A. $BC = 8$, $QR = 4$
 B. $BC = 8$, $QR = 25$
 C. $BC = 50$, $QR = 4$
 D. $BC = 50$, $QR = 25$

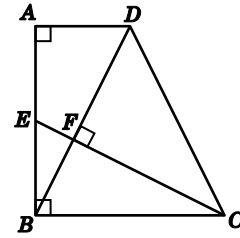
15. In the figure, BPC is a straight line.



Which of the following must be true?

- I. $\triangle ABC \sim \triangle PAC$
 - II. $\triangle ABC \sim \triangle PBA$
 - III. $\triangle PAC \sim \triangle PBA$
- A.** I only **C.** II and III only
- B.** I and III only **D.** I, II and III

16. In the figure, AEB , BFD and CFE are straight lines. $AD = BE$ and $CE = BD$.



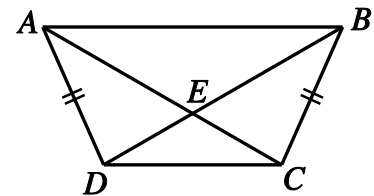
Which of the following must be true?

- I. $\triangle ABD \cong \triangle BCE$
 - II. $\triangle ABD \sim \triangle FBE$
 - III. $\triangle ADB \sim \triangle FBC$
- A.** I only **C.** II only
- B.** I and II only **D.** I, II and III

Level 2

17. In the figure, AC and BD intersect at E . It is given that $AD = BC$ and $AC = BD$.

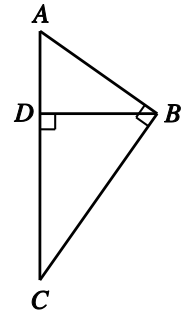
- (a) Prove that $\triangle ABD \cong \triangle BAC$.
- (b) If $\angle ABD = 32^\circ$, find $\angle DEC$.



18. In the figure, ADC is a straight line and $\angle ABC = \angle BDC = 90^\circ$.

(a) Prove that $\triangle ABC \sim \triangle BDC$.

(b) Prove that $BC^2 = AC \times DC$.



SKH St. Simon's Lui Ming Choi Secondary School
F2 Mathematics Tiered Assignment
Chapter 9 linear equation in 2 unknowns

Name : _____

Class : _____()

Date:

Tier 1

Solve the following simultaneous equation in 2 unknowns.

1.
$$\begin{cases} y = x \\ 4x + y = 15 \end{cases}$$

2.
$$\begin{cases} 7y - x = -8 \\ x = 3y \end{cases}$$

3.
$$\begin{cases} x = -2y \\ x + 3y - 5 = 0 \end{cases}$$

4.
$$\begin{cases} y = 5x - 2 \\ x = y + 6 \end{cases}$$

5.
$$\begin{cases} x - y = -8 \\ x + y = 4 \end{cases}$$

6.
$$\begin{cases} 3x + 2y = -3 \\ 3x - 2y = 9 \end{cases}$$

7.
$$\begin{cases} 6x = 11 + y \\ 3x = 16 - y \end{cases}$$

8.
$$\begin{cases} 2x - 5y = -12 \\ -3x + 5y = 33 \end{cases}$$

$$9. \begin{cases} b = 2a - 5 \\ a + b = 7 \end{cases}$$

$$10. \begin{cases} 2h + k = 3 \\ 5h - k = -24 \end{cases}$$

$$11. \begin{cases} m = 2n - 1 \\ m = 5 - 2n \end{cases}$$

$$12. \begin{cases} a = 7b + 13 \\ 6a = 7b + 8 \end{cases}$$

13. The sum of two numbers is 60 and their difference is 12. Find these two numbers.

14. The sum of two numbers is 100 and the larger number is 3 times the smaller number.
Find the smaller number.

15. There are some ducks and sheep on a farm. The total numbers of heads and feet for these animals are 48 and 132 respectively. How many ducks and how many sheep are there on the farm?

16. Solve $\begin{cases} y = 7 - 2x \\ x = -2y - 4 \end{cases}$.

A. $x = -6$, $y = 5$

B. $x = -5$, $y = 6$

C. $x = 5$, $y = -6$

D. $x = 6$, $y = -5$

17. Solve $\begin{cases} 2h - 3k = -1 \\ 3h + 2k = -34 \end{cases}$.

A. $h = -9$, $k = -6$

B. $h = -8$, $k = -5$

C. $h = -7$, $k = -5$

D. $h = -6$, $k = -4$

18. The total price of 2 pencils and 9 erasers is \$92, while the total price of 8 pencils and 3 erasers is \$104. Find the price of a pencil.

A. \$8

B. \$9

C. \$10

D. \$11

19. In a bag, there are 18 prisms with 101 faces in total. If the bag contains triangular prisms and rectangular prisms only, how many triangular prisms are there?

A. 5

B. 7

C. 9

D. 11

Tier 2

Solve the following simultaneous equations in 2 unknowns

20. $3h + 8k + 3 = -h - 3k - 7 = -4$

21.
$$\begin{cases} \frac{2}{7}m = 3 - n \\ \frac{4}{7}m - 2n + 10 = 0 \end{cases}$$

22. Sam is 5 years older than Bill. Three years later, Bill's age will be $\frac{4}{5}$ of Sam's. How old is Bill now?

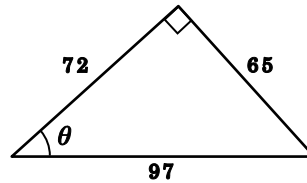
23. Edison is 11 years older than Ken. The age of Edison four years later will be 3 times the age of Ken three years ago. How old is Edison now?

SKH St. Simon's Lui Ming Choi Secondary School
Form 2 Mathematics Tiered Assignment
Chapter 12 Trigonometric Ratios

Name: _____ Class: _____ () Date: _____

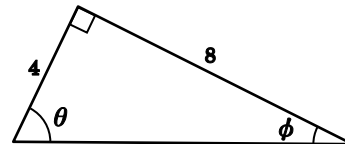
1. In the figure, $\sin \theta =$

- A. $\frac{65}{97}$.
- B. $\frac{72}{97}$.
- C. $\frac{65}{72}$.
- D. $\frac{97}{72}$.



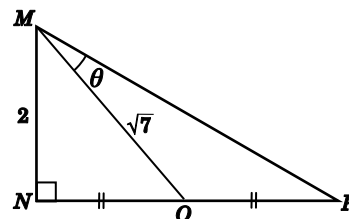
2. Refer to the figure. Find the value of $\theta - \phi$, correct to the nearest degree.

- A. 35°
- B. 36°
- C. 37°
- D. 38°



3. Find θ in the figure, correct to the nearest degree.

- A. 16°
- B. 19°
- C. 22°
- D. 25°

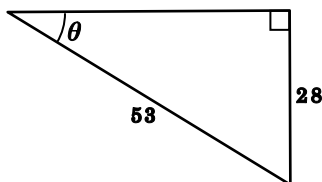


Level 1

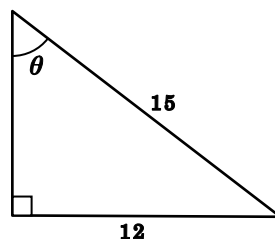
Find θ in each of the following figures. [Nos. 4–6]

(Give the answers correct to the nearest degree.)

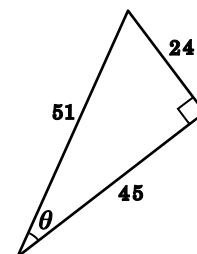
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5.



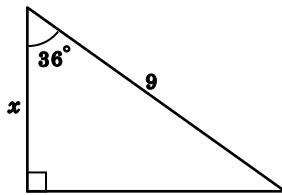
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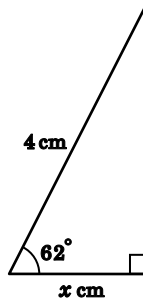
Find the value of x in each of the following figures. [Nos. 7–9]

(Give the answers correct to 3 significant figures.)

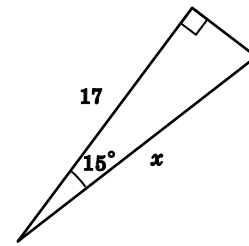
7.



8.



9.



10. Find θ in each of the following.

(Give the answers correct to the nearest 0.1° .)

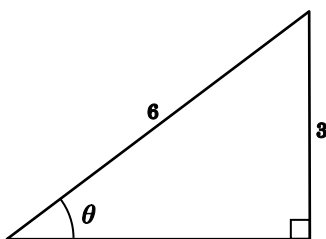
(a) $9 \tan \theta = 7$

(b) $\frac{1}{2} \tan \theta = 6$

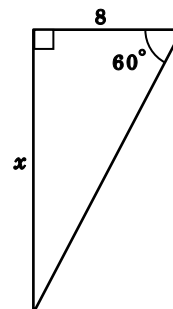
(c) $\frac{3}{4 \tan \theta} = \frac{1}{2}$

Find the unknown in each of the following figures. [Nos. 11–12]

11.



12.



Level 2

13. $9 - 3 \tan \theta = 6$

14. $2 \cos \theta = \frac{1}{\tan 30^\circ}$

- 15.** Two towers AB and MN are 100 m apart, where the height of tower AB is 18 m. A bird flies along a straight line from the roof of AB to the roof of MN , which makes an angle of 16° with the horizontal. What is the height of tower MN ?

