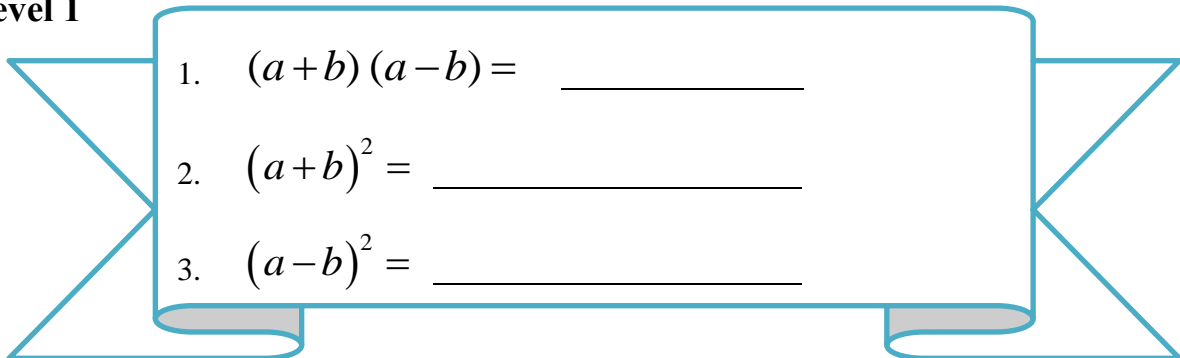


**SKH St. Simon's Lui Ming Choi Secondary School**  
**Form 2 Mathematics Tiered Assignment**  
**Chapter 2 Identities and Factorization**

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)  $298 \times 302$

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  $N$ .

**SKH St. Simon's Lui Ming Choi Secondary School**  
**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)  $\frac{4m}{n} \times \frac{5n}{8m}$

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

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

(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:**

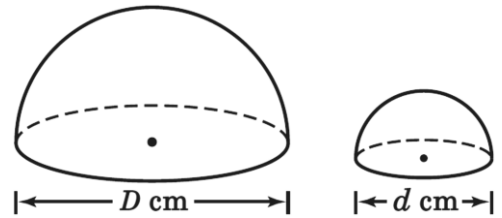
11. Simplify

(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  $V$  cm<sup>3</sup> 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 cm<sup>3</sup> 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  $\ell$  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  $M$ ,  $\ell$  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  $120^\circ$ ?

# SKH St. Simon's Lui Ming Choi Secondary School

## Form 2 Mathematics Tiered Assignment

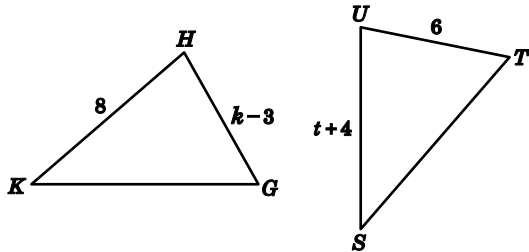
### Chapter 5 Congruence Chapter 8 Similarly

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

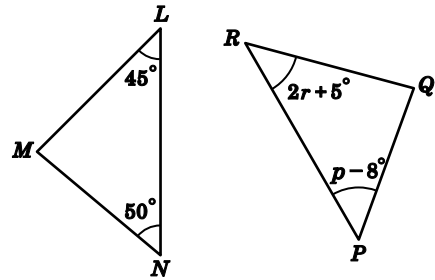
#### Level 1

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

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

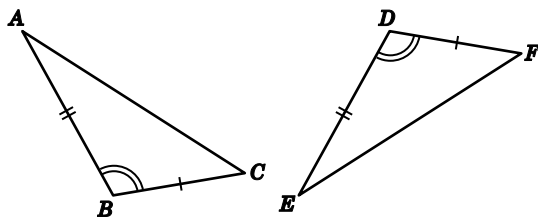


2.  $\triangle MLN \cong \triangle QRP$

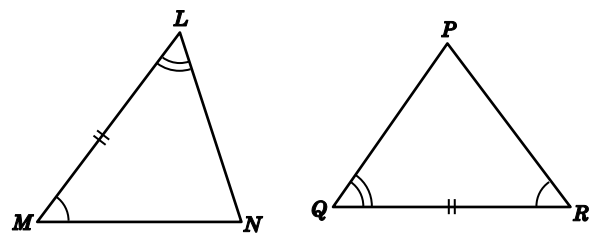


Prove that the following pairs of triangles are congruent. [Nos. 3-4]

3.

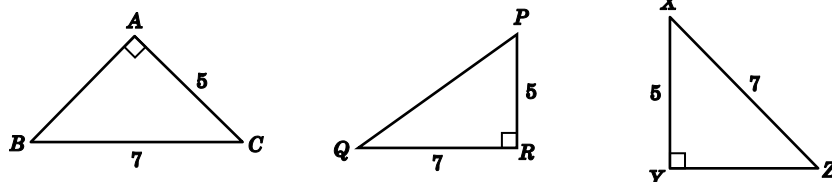


4.



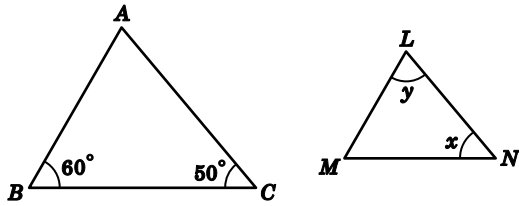
Determine which two triangles must be congruent and give a proof to explain your answer.

5.

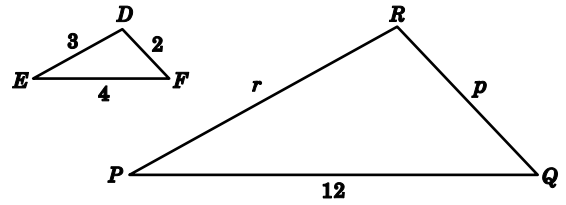


Find the unknowns in each of the following pairs of similar triangles. [Nos. 6-7]

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

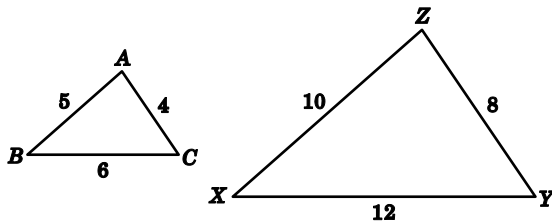


7.  $\triangle DEF \sim \triangle RPQ$

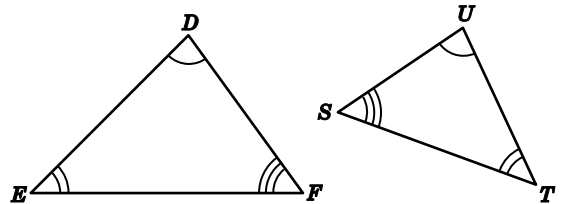


Prove that the following pairs of triangles are similar. [Nos. 8-9]

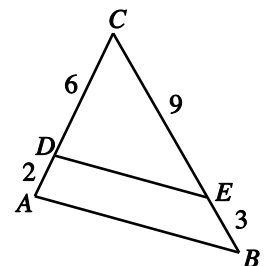
8.



9.



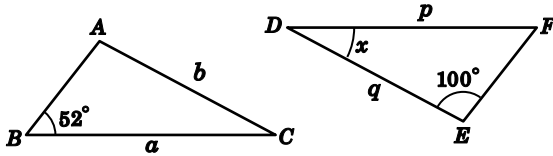
10. In the figure,  $CDA$  and  $CEB$  are straight lines. Prove that  $\triangle ABC \sim \triangle DEC$ .



Multiple Choice Question

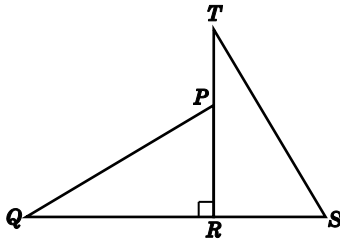
11.	12.	13.
14.	15.	16.

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



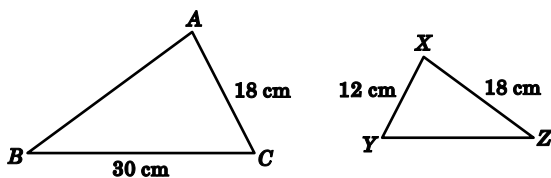
- A.  $a = b, p = q, x = 28^\circ$   
 B.  $a = b, p = q, x = 52^\circ$   
 C.  $a = p, b = q, x = 28^\circ$   
 D.  $a = p, b = q, x = 52^\circ$

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  $YZ$ .

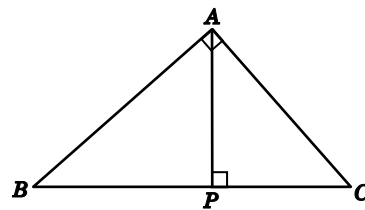


- A.  $AB = 12$  cm,  $YZ = 20$  cm  
 B.  $AB = 12$  cm,  $YZ = 30$  cm  
 C.  $AB = 27$  cm,  $YZ = 20$  cm  
 D.  $AB = 27$  cm,  $YZ = 30$  cm

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.

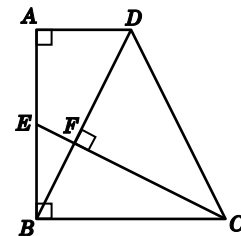


Which of the following must be true?

- I.  $\triangle ABC \sim \triangle PAC$   
 II.  $\triangle ABC \sim \triangle PBA$   
 III.  $\triangle PAC \sim \triangle PBA$

- A. I only  
 B. I and III only  
 C. II 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.  $\triangle ADB \sim \triangle FBC$

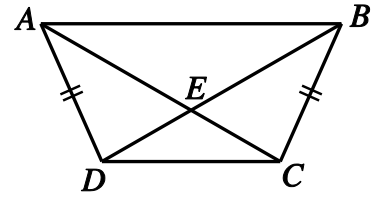
- A. I only  
 B. I and II only  
 C. II only  
 D. I, II and III

**Level 2**

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

**(a)** Prove that  $\triangle ABD \cong \triangle BAC$ .

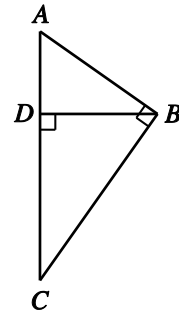
**(b)** If  $\angle ABD = 32^\circ$ , find  $\angle DEC$ .



**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:

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**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?

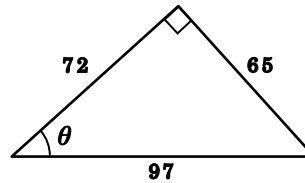
**23.** Edison is 11 years older than Ken. The age of Edison four years later will be 3 times the age of Ken three years ago. How old is Edison now?

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

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

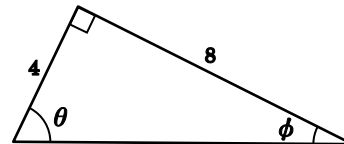
1. In the figure,  $\sin \theta =$

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



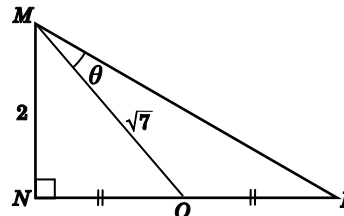

2. Refer to the figure. Find the value of  $\theta - \phi$ , correct to the nearest degree.

- A.  $35^\circ$
- B.  $36^\circ$
- C.  $37^\circ$
- D.  $38^\circ$




3. Find  $\theta$  in the figure, correct to the nearest degree.

- A.  $16^\circ$
- B.  $19^\circ$
- C.  $22^\circ$
- D.  $25^\circ$

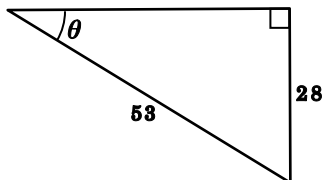



**Level 1**

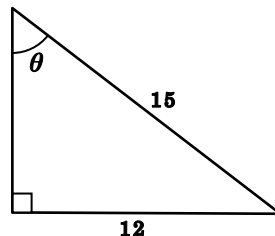
Find  $\theta$  in each of the following figures. [Nos. 4–6]

(Give the answers correct to the nearest degree.)

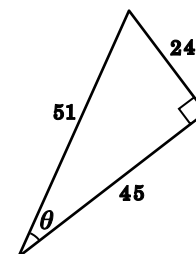
4.



5.



6.

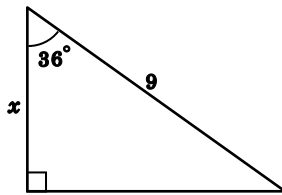




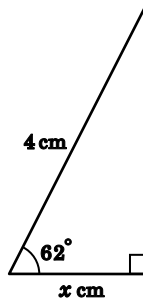
Find the value of  $x$  in each of the following figures. [Nos. 7–9]

(Give the answers correct to 3 significant figures.)

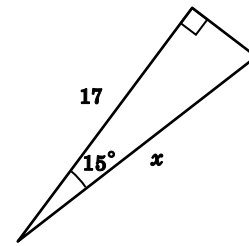
7.



8.



9.



10. Find  $\theta$  in each of the following.

(Give the answers correct to the nearest  $0.1^\circ$ .)

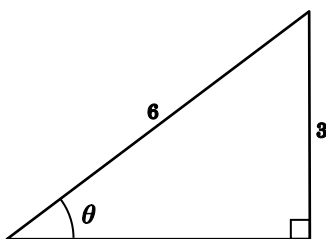
(a)  $9 \tan \theta = 7$

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

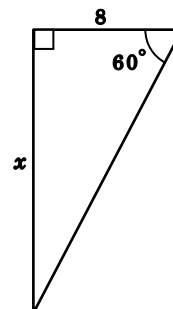
(c)  $\frac{3}{4 \tan \theta} = \frac{1}{2}$

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  $16^\circ$  with the horizontal. What is the height of tower  $MN$ ?

