"Thurstan College, being unshaken amidst the COVID 19 challenges"

Series of Supportive Activities

Grade 9 - Mathematics

THURSTAN COLLEGE

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Thurstan College, being unshaken amidst the COVID 19 challenges

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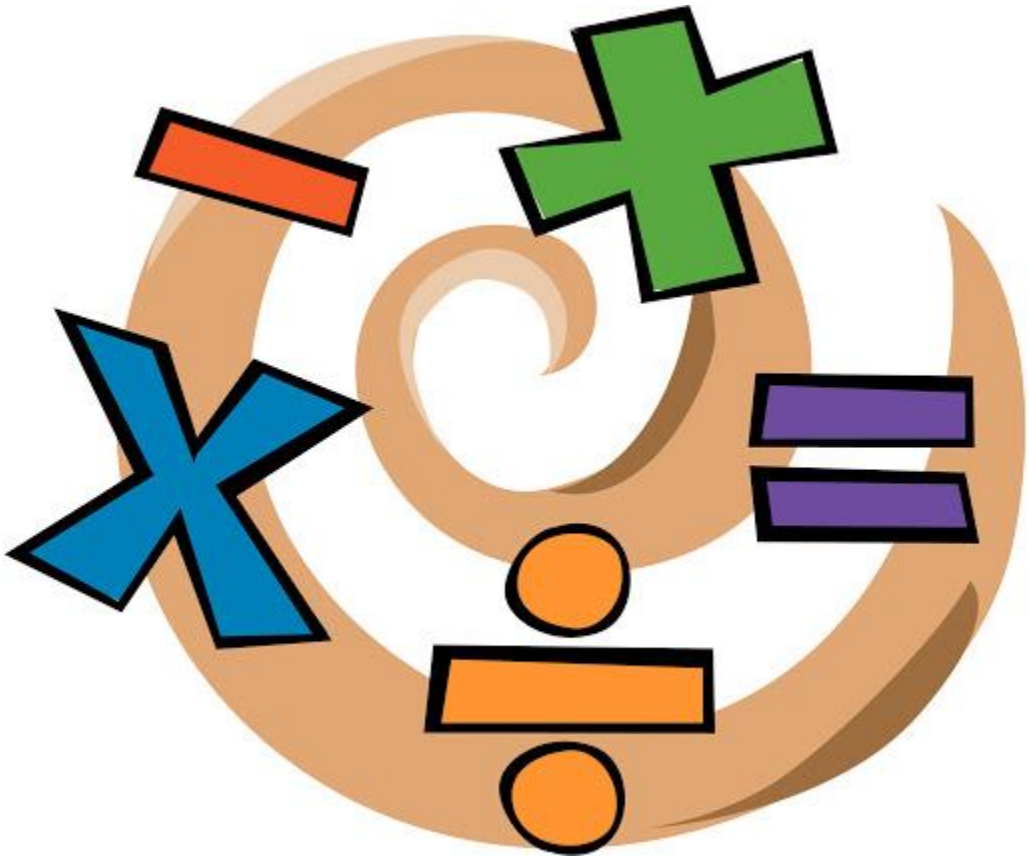
Thurstan College

MATHEMATICS

Activity Book

Grade 9

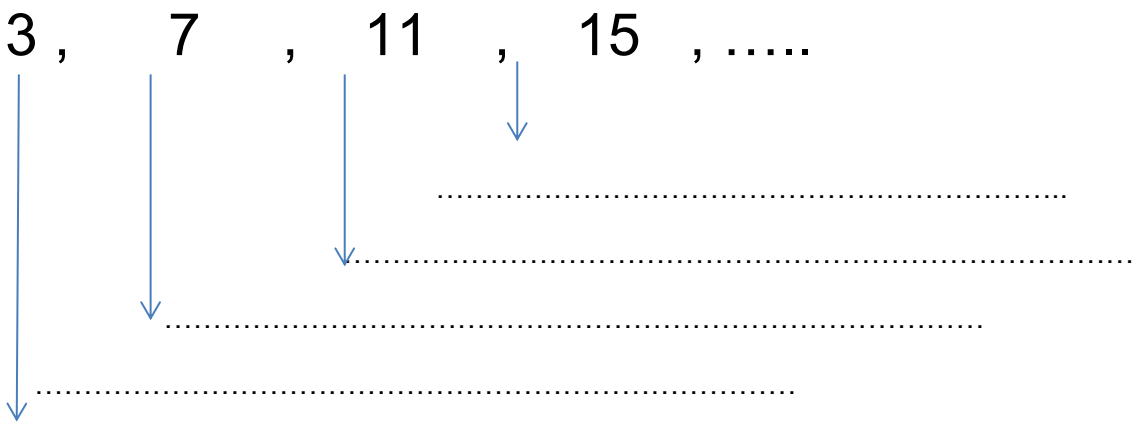


Number Patterns

1. Complete the following table.

Number Pattern	General term
2 , 4 , 6 , 8 ,…….	
1 , 3 , 5 , 7 , 9 ,…….	
3 , 6 , 9 , 12 , …….	
1 , 4 , 9 , 16 , …….	
1 , 3 , 6 , 10 , ……..	

2. Consider the number pattern



Common difference = Any term except - The previous term

the first term

3. Find the common difference of each of the following number patterns.

(i) 2 , 5 , 8 , 11 , ……

(ii) 5 , 12 , 19 , …….

(iii) -2 , -5 , -8 , ……..

(iv) -10 , -12 , -14 , …….

(v) -20 , -15 , -10 ,……..

4. Find the general term of each of the number patterns given below

(i) 2 , 5 , 8 , 11 , ……..

(ii) 8 , 12 , 16 , …….

(iii) -2 , - 5 , - 8 , ……..

(iv) -20 , - 15 , - 10 , …….

5. The general term of a number pattern is 2n + 3.

(i) Write the first three terms of this number pattern

(ii) Find the tenth term

(iii) Which term is 43 ?

(iv) Show that 50 is not a term of this number pattern

(v) Write the $(n+1)^{th}$ term , in terms of n .

6. The general term of a number pattern is $3 - 4n$.

(i) Write the first three terms of this number pattern.

(ii) Find the 12^{th} term.

(iii) Which term is equal to -77 ?

(iv) Show that -82 is not a term of this number pattern .

7. Find the common difference of the following number pattern

$\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$, ……

Binary Numbers

1. What are the digits that used in binary number system ?

2. What are the digits that used in decimal number system ?

3. Convert the decimal numbers given below into binary numbers .

(i) 20 (ii) 35

4. Convert the binary numbers given below into decimal numbers .

(i) 1111_{two} (ii) 10101_{two}

(ii) 1001_{two} (i) 101_{two}

5. Fill in the blanks.

(i) $1_{two} + 0_{two}$ = ……

(ii) $0_{two} + 1_{two}$ = ……

(iii) $1_{two} + 1_{two}$ = ……

.

(iv) $0_{two} + 0_{two}$ = ……

(v) $10_{two} + 1_{two}$ = ……

6. Find the value.

(i) $1001_{two} + 101_{two}$ = ……

(ii) $1111_{two} + 11_{two}$ = ……

(iii) $1001_{two} + 11101_{two}$ =

(iv) $1111_{two} + 111_{two} + 11_{two}$

7. Fill in the blanks.

(i) $1_{two} - 1_{two} =$ ……

(ii) $1_{two} - 0_{two} =$ ……

(ii) $0_{two} - 0_{two} =$ ……

(iv) $10_{two} - 1_{two} =$ ……

(vi) $100_{two} - 1_{two} =$ ……

6. Find the value.

(i) $1011_{two} - 10_{two} =$

(ii) $1100_{two} - 111_{two} =$

(iii) $11000_{two} - 1111_{two} =$

(iv) $110011_{two} - 1100_{two} - 11_{two} =$

(v) $11111_{two} - (110_{two} + 11_{two}) =$

Fractions

1. Find the value .

$\frac{5}{6} - \frac{1}{3}$

$\frac{7}{12} + \frac{1}{4} - \frac{1}{3}$

$3\frac{5}{6} - 1\frac{1}{3}$

$1\frac{1}{2} + 2\frac{1}{3}$

$\frac{2}{3} \times \frac{5}{8} \times \frac{3}{10}$

$3\frac{3}{10} \times 2\frac{1}{3} \times 4\frac{2}{7}$

$8 \div \frac{4}{5}$

$5\frac{1}{5} \div \frac{13}{5}$

$\frac{5}{8}$ of $\frac{2}{5}$

$1\frac{4}{5}$ of $\frac{5}{9}$

2. How much is $\frac{2}{5}$ of 1000 rupees ?

3. How many meters is $\frac{7}{10}$ of 2 km ?

4. A person who owns $\frac{7}{8}$ of a land, gives $\frac{5}{7}$ of it to his son .What is the portion received by son as a fraction of the whole land ?

5. A person puts aside $\frac{1}{3}$ of his income for food and ½ for medicine .What fraction of his income does he spend for medicine ?

6. Kamal travelled $\frac{1}{2}$ of a journey by bus ,$\frac{1}{3}$ of it by train and travelled the remaining distance by three wheeler.
   (i) Express the distance he travelled by bus and by train as a fraction of the total distance.

   (ii) Express the distance travelled by three wheeler as a fraction of the total distance.

7. Simplify

$\frac{1}{2}+\frac{1}{3}-\frac{1}{4}$

$\frac{1}{2}-\frac{1}{3}+\frac{1}{4}$

$(\frac{2}{5}-\frac{1}{2})\times 3\frac{1}{3}$

$(\frac{1}{5}+\frac{1}{2})\div 3\frac{1}{2}$

$1-(\frac{2}{5}+\frac{3}{5}\times\frac{2}{3})$

$(4\frac{1}{2}-3\frac{1}{3})\,of\quad 2\frac{4}{7}$

$$\frac{3}{7} + 1\frac{1}{2} \div \frac{4}{5} \; of \; \frac{5}{6}$$

$$\frac{1}{3} + 1\frac{1}{2} \; of \; \frac{1}{3} \div \frac{5}{6}$$

Percentages

1. If a vendor buys a school bag for Rs.1000 and sells it at Rs. 1500.Determine his profit.

2. If a television which is worth Rs.8000 is sold at the price of Rs.6000 , determine the loss .

3. If a vendor buys an item for Rs.2000 and sells it at Rs. 2500.Determine his profit and the profit percentage

4. If a computer which is worth Rs50 000 is sold at the price of Rs.30 000 , determine the loss and loss percentage

5. If a vendor buys an item for Rs.1000 and earns a profit percentage of 30%by selling it.Calculate the selling price of the item.

6. If a vendor buys an item for Rs.2000 and sells it at a loss of 15% .Calculate the selling price of the item.

7. Sunil buys books which are worth Rs.2000from a book shop when offers a discount of 20%.Calculate the discount that Sunil receives .

8. A discount of Rs 3500 is given on the marked price of Rs.10000 when a certain item is bought. Find the discount percentage offered.

9. A person charges a commission of 3% on sale of a vehicle. When selling vehicle Rs.2000000 ,
   (i) How much needs to be paid as the commission?
   (ii) How much does the vehicle owner receive after paying the commission?

10. If a broker charged Rs.150000 for selling a land which was worth Rs.5000000. Calculate the commission percentage that he charged.

Algebraic Expressions

1. Expand and simplify each of the following expressions.

(i) 5 (m + n) + 2 (m + n)

(ii) 2 (3p – q) -3 (p –q)

2. Find the value of each of the following expressions when $x = 3, y = -2$, $p = \frac{2}{3}, q = \frac{3}{4}, a = -\frac{1}{3} and\ b = -2$

(i) $2x - 3y$

(ii) $3(2x + y)$

(ii) $3p + 4y$

(iv) $8q - 6p$

(vi) $3a - 2b$

(vi) $-6a + 3b$

3. Expand and simplify each of the following products of binomial expressions.

(i) $(x + 2) (x + 3)$

(ii) $(x – 2) (x – 3)$

(ii) $(x + 2) (x – 3)$

(iv) $(x – 2) (x+ 3)$

(vi) $(2 – x) (3 – x)$

(v) $(2 + x) (3 – x)$

Factors of Algebraic expressions

1. Find the HCF (Highest Common Factor) of following terms

(i) $4a^2b$ and $8ab^2$

(ii) 3a , 15b and $9c^2$

(ii) $10x^2y$, and $50x^2yz$

(iv) 6m and $-12m^2n$

2. Write each of the following algebraic expressions as a product of factors.

(i) 8a + 12b

(ii) 20x - 30y

(ii) $3a - 2a^2b$

(iv) 4xy + 4xz - 4x

3. Factorize each of the following algebraic expressions.

(i) $y^2 + 7y + 2y + 14$

(ii) $b^2 - 7b - 2b + 14$

(iii) $m^2 - 8m + 2m - 16$

(iv) $7 + 7n - m - mn$

4. Factorize the quadratic expressions given below.

(i) $x^2 + 5x + 6$

(ii) $x^2 + 12x + 20$

(ii) $x^2 - 5x + 6$

(iv)) $x^2 - 12x + 20$

(iv) $x^2 + 4x - 1 2$

(vi) $x^2 - 4x - 1$

(vii) $x^2 + 7x - 30$

(viii) $x^2 - 7x - 30$

5. Factorize the expressions given below.

(i) $x^2 - 81$

(ii) $a^2 - 400$

(ii) $25 - b^2$

(iv) $36 - x^2$

(v) $4x^2 - 9y^2$

(vi) $16b^2 - 25c^2$

(vi) $x^3 y^3 - x y$

(viii) $3a^2 - 343$

6. Factorize the following algebraic expressions by changing the order in which the terms appear as required.

(i) $4 - a^2 - 3a$

(ii) $ax + by - ay - bx$

7. Find the value

(i) $103^2 - 3^2$

(ii) $52^2 - 2^2$

Axioms

1. What are Axioms ?

2. Write the five axioms.

(i)

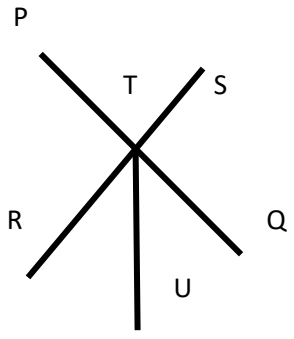
(ii)

(iii)

(iv)

(v)

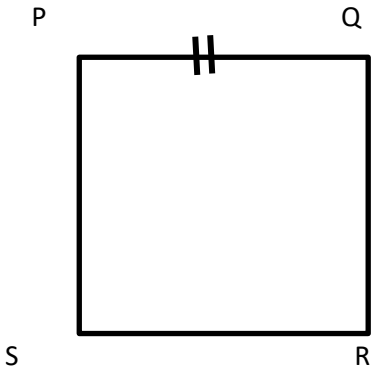
3. The straight lines PQ and RS intersect at T .
   In the figure , angle STQ = angle QTU , If PTR = 75^0 Find the magnitude of angle UTR .

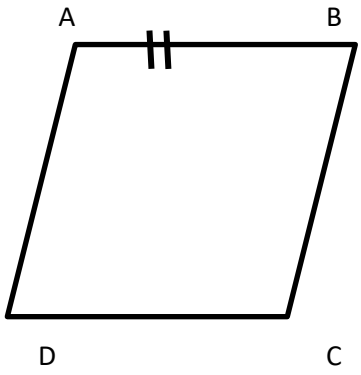


4. In the straight line AB , AB = CD . Show that AC = BD

5. In the straight line PS , PR = QS . Show that PQ = RS

6. The square PQRS and the rhombus ABCD are such that PQ = AB .Using axiom 4 , show that the perimeter of the square PQRS is equal to the perimeter of the rhombus ABCD .



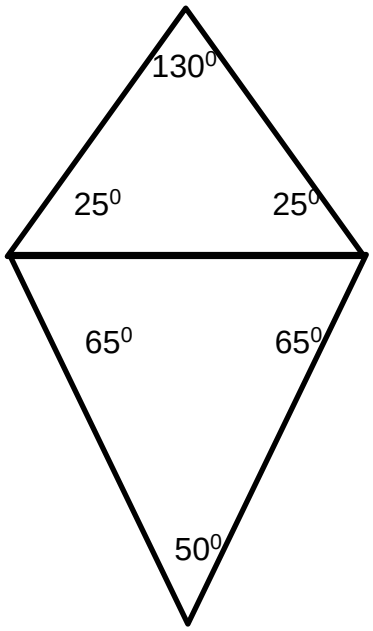


7. If ab = ac , Show that b = c by using the axiom 5.

Angles related to straight lines and parallel lines

1. What are adjacent angles ?

2. Based on the magnitudes of the angles shown in the figure. Write ,

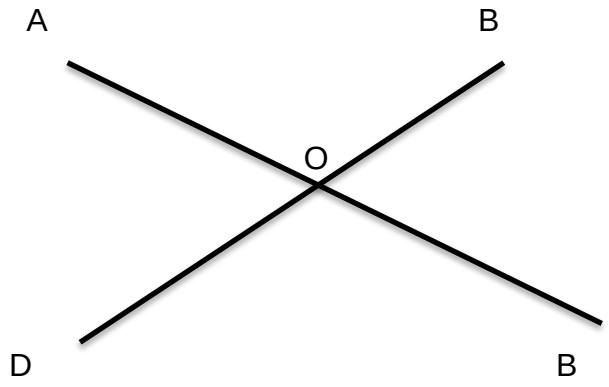


(i) Four pairs of complementary angles

(ii) Two pairs of complementary adjacent angles

(iii) Two pairs of supplementary angles.

3. In the figure , the straight lines AB and CD intersect each other at O .



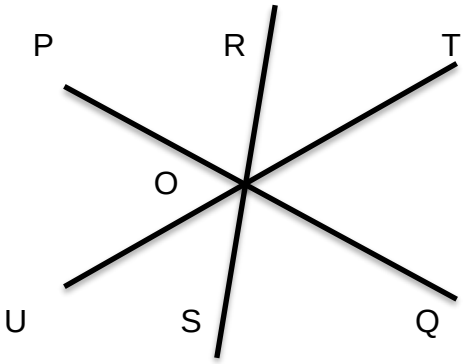
(i) Write vertically opposite angles for given angles

(a) Angle AOD
(b) Angle AOC

(ii) If angle AOD $= 40^0$, find the magnitudes of following angles

(a) Angle AOC
(b) Angle BOC
(c) Angle BOD

4.



In the figure , the straight lines PQ , RS and TU intersect at O.

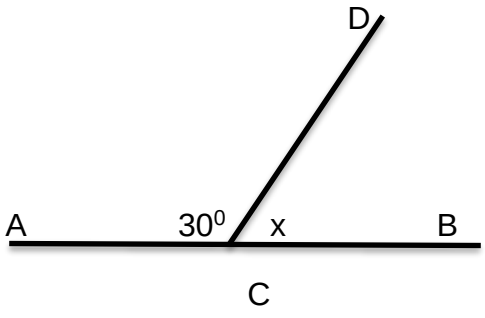
Write the vertically opposite angles for given angles

(i) Angle POT

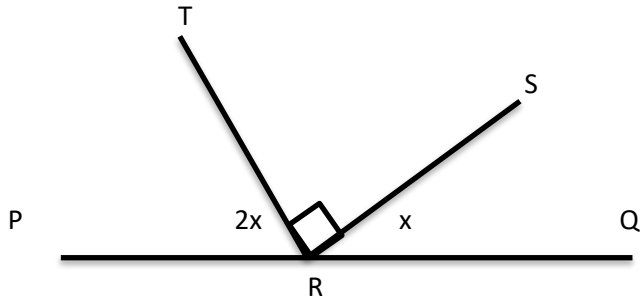
(ii) Angle ROQ

(iii) Angle TOS

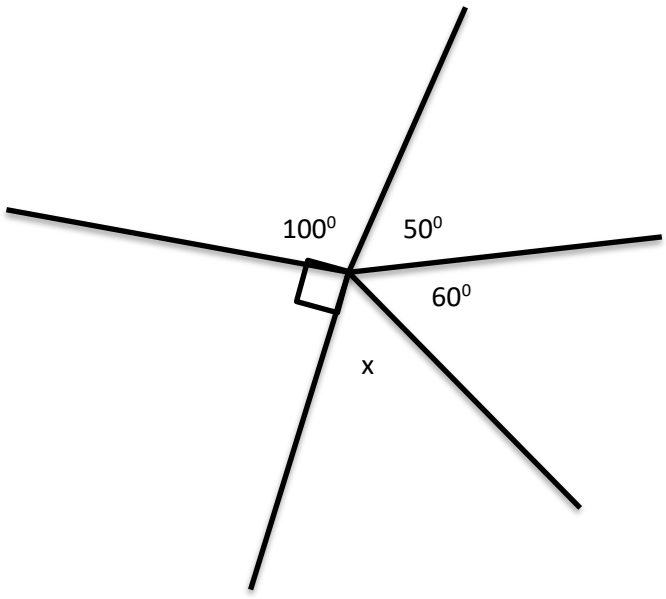
5. AB and CD are straight lines. Find the value of x



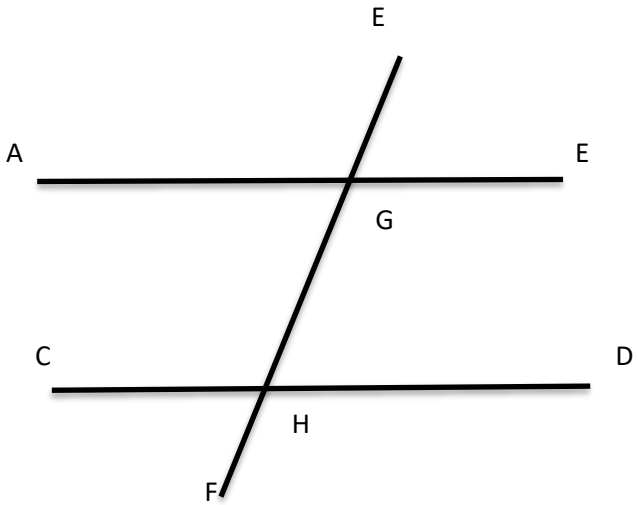
6. PQ , RS and TR are straight lines. Find the magnitude of angle PTR.



7. Find the value of x



8.

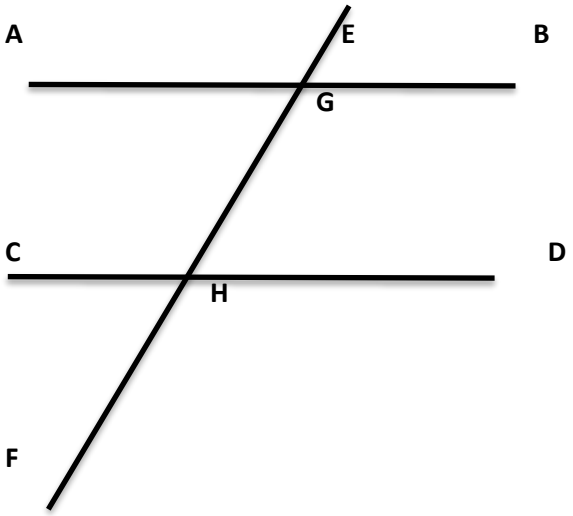


(i) Name the line which can be considered as the transversal.

(ii) Write four pairs of corresponding angles

(iii) Write two pairs of alternate angles

(iv) Write two pairs of allied angles.



9. Fill in the blanks

(i) Angles AGH = Angle …… (alternate angles)

(ii) Angle BGH = Angle GHC (……)

(iii) Angle AGH = …….. (Corresponding angles)

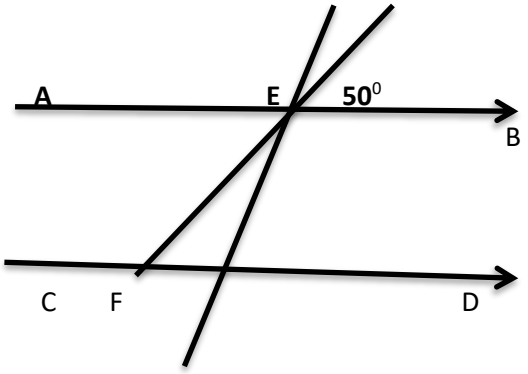
(iv) Angle DHF = Angle BGH (……)

(v) Angle AGE = Angle …….. (corresponding angles)

(vi) Angle AGH + Angle CHG = …….. (allied angles)

(vii) …….. + ……..= 180^0 (allied angles)

10. Find the magnitude of each of the following angles.



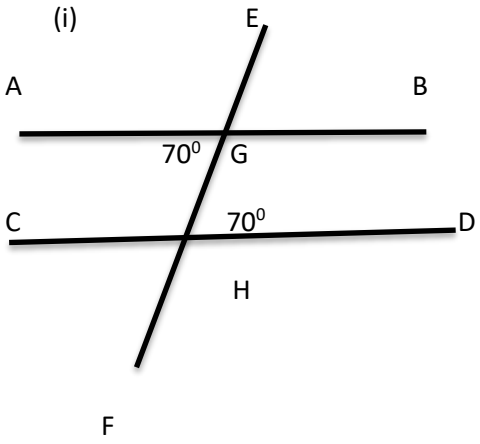
(i) Angle AEF

(ii) Angle EFC

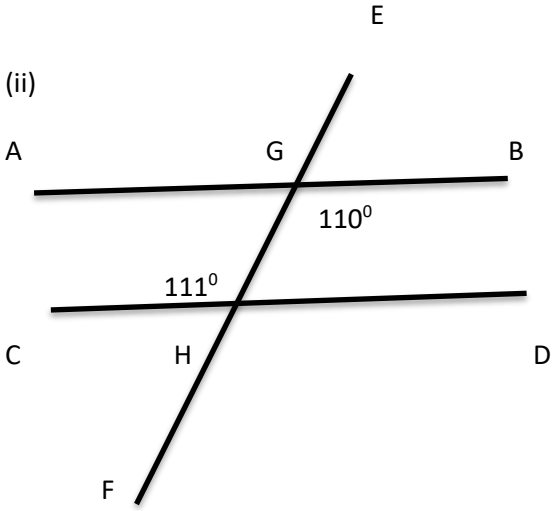
(iii) Angle FEG + Angle EGF

11. Based on the information in each of the following figures , giving reasons state whether AB and CD are parallel.

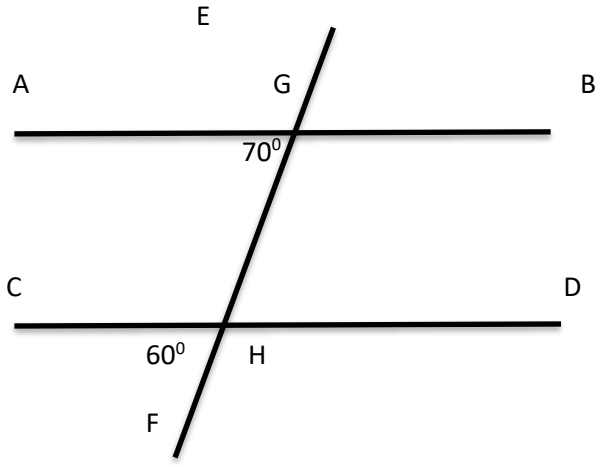
(i)



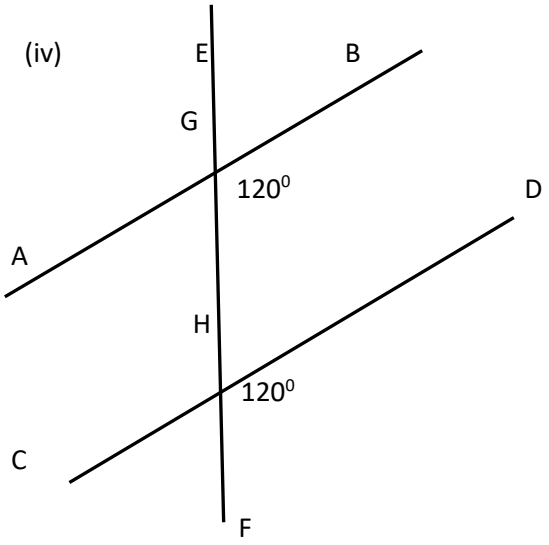
(ii)



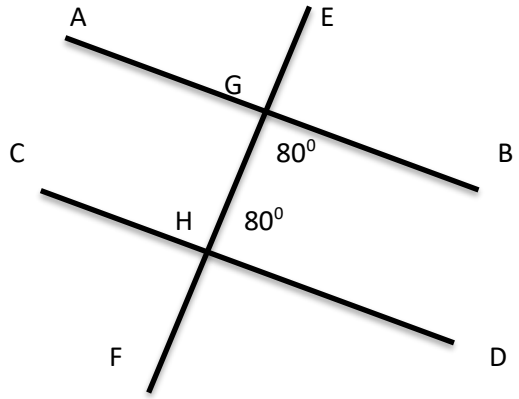
(iii)



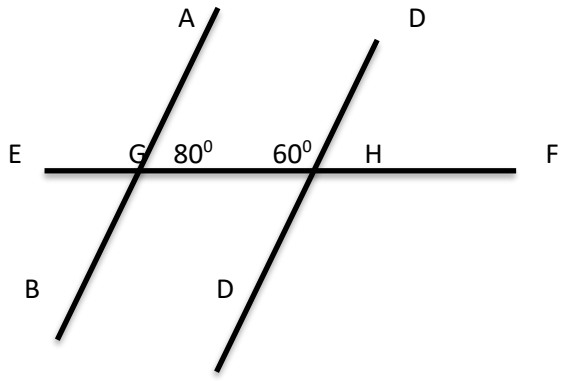
(iv)



(v)



(vi)



Liquid Measurement

1. What is volume ?

2. What is capacity ?

3. Complete the table

Milliliter	Liters and milliliters		Liters
	l	*ml*	
2500			2.5
3550		550	
1200	1		
750			0.75
80			

4. Find the volume of a cuboid with length ,breadth and height are 10cm , 8 cm and 6 cm respectively.

5. Calculate the volume of a cube with side length 20 cm.

6. Fill in the blanks.

$1\ cm^3 = 1\ ml$

(i) $2\ cm^3$ = ……

(ii) $10\ cm^3$ = ……..

(iii) $100\ cm^3$ = ……

(iv) $70\ cm^3$ = ……

(v) 20 ml = ……..

(vi) 350 ml = ……

$1\ m^3 = 1000\ l$

(i) $2\ m^3$ = ……

(ii) $4\ m^3$ = ……..

(iii) $2.5\ m^3$ = ……..

(iv) $0.75\ m^3$ = ……

8. The length, width and height of a container are 30 cm ,10 cm and 12 cm respectively. The container is filled with water up to a height of 7 cm.

   (i) Find the capacity of the container.

   (ii) Calculate volume of the water in the container now in cubic centimeters.

   (iii) Express this volume in milliliters

   (iv) If the water in the container is to be poured into vessels of capacity 1.05 l .Find the number of vessels required to fill all the water in the container.