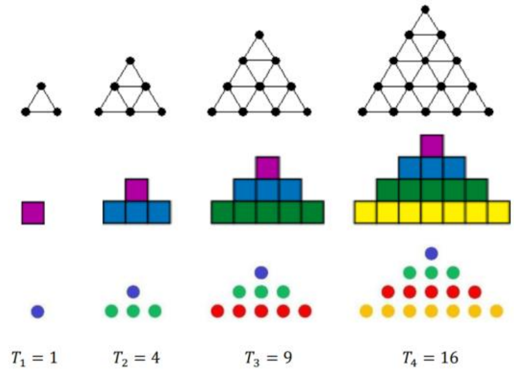
Grade 9

Mathematics

Unit – 01

01. Number Patterns



01. What is a number pattern? Write two examples.

02. Write the next two terms of the following number patterns

i. $6, 12, 18, \ldots\ldots, \ldots\ldots$ ii. $3, 7, 11, \ldots\ldots, \ldots\ldots$

iii. $-2, -4, -6, \ldots\ldots, \ldots\ldots$ iv. $20, 17, 14, \ldots\ldots, \ldots\ldots$

v. $-4, 0, 4, \ldots\ldots, \ldots\ldots$ vi. $35, 29, 23, \ldots\ldots, \ldots\ldots$

03. find the common difference of the following number patterns.

i. $3, 10, 17, \ldots\ldots, \ldots\ldots$ ii. $25, 21, 17, \ldots\ldots, \ldots\ldots$

iii. $-1, -5, -9, \ldots\ldots, \ldots\ldots$ iv. $2.5, 2.2, 1.9, \ldots\ldots, \ldots\ldots$

v. $-3, 0, 3, \ldots\ldots, \ldots\ldots$ vi. $40, 35, 30, \ldots\ldots, \ldots\ldots$

04. In the number patterns 10, 14, 18, 22....,

i. What is the first term?

ii. Find 6^{th} term.

iii. Find the common difference.

05. In a number pattern general term is $T_n = 5n - 2$,

i. Find its first three terms and write the number pattern.

ii. Find its common difference.

iii. Find its 10^{th} term.

iv. Is 32 a term of this number pattern?

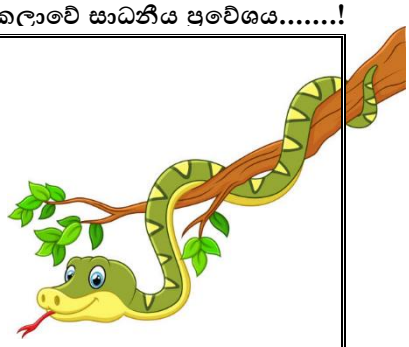
06. In a number pattern general term is $T_n = 8 - 3n$,

i. Find its first three terms and write the number pattern.

ii. Which term is -52 in this number pattern ?

iii. Is - 99 a term of this number pattern? Give reasons

iv. Find the $(n+1)^{th}$ term of the number pattern ?



07. The general term of a number pattern is $T_n = \frac{n}{3} + 4$

i. Find its first three terms and write the number pattern.

ii. Find its 15^{th} term.

iv. Which term is 16 in this number pattern ?

v. Show that 49 is a term of this number pattern.

08. Complete the following table using the number pattern 10,14,18,22,....

Order of the terms	Term	How the pattern has been developed
1^{st} term	.....	4 X 1 + 6
2^{nd} term	14	.....
3^{rd} term	.....	4 X 3 + 6
4^{th} term	22	.....
n^{th} Term	.....	4 X n + 6

09. Find the general term of the following number patterns.

i. 5, 10, 15, 20, ...

ii. 4, 7, 10, 13, ...

iii. 5, 12, 19, 26, ….

iv. 34, 28, 22, 16, ...

v. 52, 48, 44, 40, …

10. A cyclist who is practicing on weekly will ride 50km in the first week. After that in every week if he rides more than 5km to the previous week,

i. Write the distance that he rides in the first 4 weeks separately.

ii. Build up an expression to find the distance traveled in the n^{th} week.

iii. How far is he going in Week 12?

iv. In which week he rides 100km ?

❖ Past paper questions (Number patterns)

01. A pattern created by using matchsticks is shown as below. Answer the following questions by using these figures.

Fig (1) Fig (2) Fig (3)

i. Fill in the table

Figure	Number of match sticks.
1	
2	
3	

ii. Find the number of match sticks, which are used to create n^{th} figure.

iii. Create an expression to number of match sticks needed to create $(n-1)^{th}$ figure.

iv. Find the number of matchsticks to create 12^{th} figure.

v. Malith says “71 match sticks enough to create figure (15).” Is it correct? Give the reason?

02. The general term of a certain number pattern is $7n + 2$

i) Find the first three terms of the number pattern

ii) Find the common difference

iii) Find the 20^{th} and 50^{th} terms of the number pattern

iv) Which the term is 93 of above number pattern

v) Find the $(n+1)^{th}$ term of the number pattern

vi) Find the difference between 2025^{th} and 2026^{th} term of the above number pattern?

03. Consider the number pattern with general term $T_n = 2n + 1$.

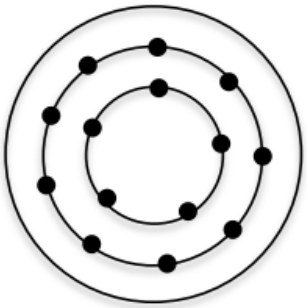
I) Write the first term of this sequence

ii) Writer the first four terms of this sequence.

iii) What is the special characteristic that can be observed with your written number pattern

iv) Which term is equal to 41?

04. The Following diagram shows an arrangement of bulbs in a pandol.



i) Find the number of bulbs in 4^{th} circular frame.

ii) Find the bulbs in n^{th} circular frame using n.

iii) Find the number of bulbs in 10^{th} circular frame.

iv) If there are 49 bulbs in last circular frame How many circular frames are in the pandol.

05. During a practice session, an athlete runs 2 rounds around a playground on the first day, 5 rounds on the second day. Likewise he continues his practice by running three rounds more than the previous day.

i. Write down the number of rounds he runs in first four days in order.

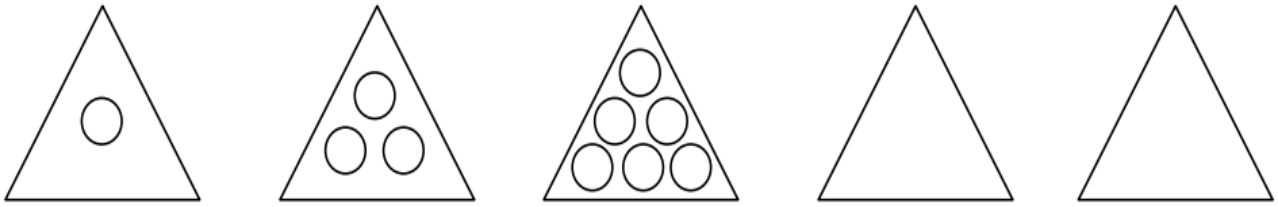
ii. If the number of rounds he runs each day is written as a number pattern, what is the first term and the common different of it?

iii. Find the general term (T_n) of it.

iv. Hence, find the number of rounds he runs on the 10^{th} day.

v. On which day of the practice session will he run 20 rounds?

06. i) Study the following pattern and complete the table.



(i) (ii) (iii) (iv) (v)

No of the pattern	(i)	(ii)	(iii)	(iv)	(v)
No of total dots	1	3	6	_____	_____

ii) The general term of a number pattern is $2n + 1$.

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

(b) Which term is equal to 25?

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

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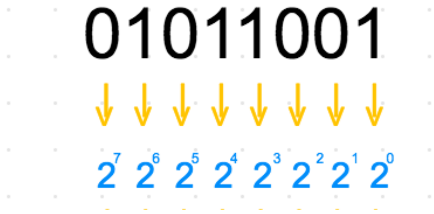
Grade 9

Mathematics

Unit – 02

02. Binary Numbers



01. How many digits are there in the binary number system?
    What are they?

02. What is the place value represented by the digit 0 in each of the following numbers?

i. 1110_{two} ii. 110111_{two} iii. 1111101_{two}

03. Write the suitable values for the blanks.

i. 1001_{two} =(8×1) + (..... ×0) + (..... × .....) + (1× .....) = ...

ii. 11011_{two} = (16 .....) + (...... 1) + (4 × .....) + (..........) + (..........) = ...

iii. 11000_{two} = (16 .....) + (.........) + (.........)+ (..........) + (..........) = ...

04. Convert the following decimal numbers into binary numbers.

i. 13   ii. 29   iii. 256

05. Convert the following binary numbers into decimal numbers.

i. 110_{two}

ii. 110111_{two}

iii. 10110110_{two}

06. Add.

i. $10011_{two} + 110_{two}$

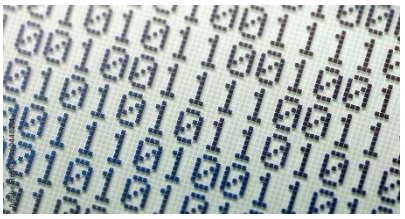
ii. $111010_{two} + 1011_{two} + 111000_{two}$

iii. $111110_{two} + 101111_{two} + 10101_{two}$

07. Fill each cage with the suitable digit.

$$\begin{array}{r} 1\ 0\ 1\ \square_{two} \\ +\quad 1\ \square\ 1_{two} \\ \hline 1\ \square\ \square\ 0\ 0_{two} \end{array}$$

$$\begin{array}{r} 1\ 0\ 1\ \square\ 1_{two} \\ -\quad \square\ 0\ 1\ 1_{two} \\ \hline 1\ \square\ 1\ 0_{two} \end{array}$$



08. Subtract.

i. $11111_{two} - 110_{two}$

ii. $11001101_{two} - 110110_{two}$

iii. $1110101_{two} - 11011_{two} - 1101_{two}$

. iv. $1110101_{two} - 11011_{two} - 1101_{two}$

09. Fill each cage with the suitable digit.

$$\begin{array}{r} \square\ 1\ \square\ 0\ 1_{two} \\ +\ 1\ 0\ \square\ 1_{two} \\ \hline 1\ 0\ \square\ 1\ 1\ 0_{two} \end{array}$$

$$\begin{array}{r} 1\ 1\ \square\ 1\ 0_{two} \\ -\ \square\ 0\ \square\ 1_{two} \\ \hline \square\ 0\ 1\ 0\ \square_{two} \end{array}$$

10. Find the value.

i. $11111001_{\text{two}} - 111_{\text{two}} - 101_{\text{two}}$

ii. $1011001_{\text{two}} - 1101_{\text{two}} + 110101_{\text{two}}$

iii. $1110001_{\text{two}} - (1011_{\text{two}} + 1101_{\text{two}})$

iv. $111011001_{\text{two}} - (10011_{\text{two}} + 10011_{\text{two}})$

v. $(1110001_{\text{two}} - 10011_{\text{two}}) + 10101001_{\text{two}}$

❖ Past paper questions (Number patterns)

01. i) Express 410_{ten} as a binary number. (02 marks)

ii) Convert the binary number 111010_{two} into base ten. (03 marks)

iii) Simplify.

$10011_{two} + 11011_{two} + 11_{two}$ (03 marks)

iv) Simplify

$11001_{two} - 1100_{two} - 1111_{two}$ (03 marks)

02. i. How many digits use to express numbers in " base two". What are they?

iii. Write 307 as the binary number.

iii. Simplify

a. $101_{two} + 110_{two}$

b. $111_{two} + 111_{two}$

iv Convert to the decimal number

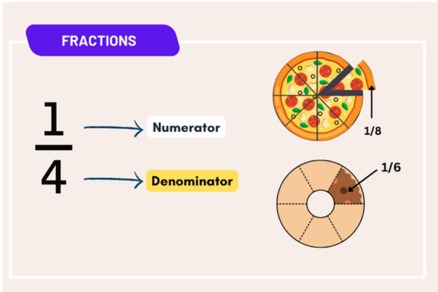
11011two

Grade 9

Mathematics

Unit – 03

03. Fractions



01. Write two equivalent fractions for each of the following fractions given below.

i. $\frac{1}{7}$ ii. $\frac{3}{5}$ iii. $\frac{8}{28}$

03. Write the suitable mixed number or improper fractions for each of the following fractions and numbers given below.

i. $4\frac{1}{4}$ ii. $\frac{23}{7}$ iii. $10\frac{1}{3}$

iv. $\frac{18}{7}$ v. $5\frac{3}{7}$ vi. $1\frac{8}{11}$

04. Simplify.

i. $\frac{3}{8}+\frac{1}{8}$ ii. $\frac{5}{12}-\frac{1}{24}$ iii. $\frac{5}{18}+\frac{2}{3}-\frac{1}{6}$

iv. $\frac{1}{6}+\frac{2}{3}-\frac{1}{18}$ v. $\frac{7}{15}-\frac{1}{3}+\frac{4}{5}$ vi. $\frac{7}{16}-\frac{3}{4}+\frac{5}{8}$

05. Simplify.

i. $\frac{1}{3} \times \frac{2}{3}$ ii. $\frac{2}{4} \times \frac{5}{4} \times \frac{7}{10}$ iii. $2\frac{4}{5} \times 2\frac{2}{7}$

06. Write down the reciprocal of following fractions.

i. $\frac{3}{5}$ ii. $\frac{5}{8}$ iii. 10 iv. $\frac{1}{7}$

07. Simplify.

i. $\frac{3}{8} \div 12$ ii. $2 \div \frac{2}{15}$ iii. $\frac{5}{21} \div \frac{1}{14}$

iv. $\frac{7}{16} \div \frac{21}{32}$ v. $\frac{13}{28} \div \frac{3}{4}$ vi. $\frac{13}{25} \div \frac{26}{50}$

08. Simplify.

i. $\frac{1}{3} - \frac{1}{2} \times \frac{1}{4}$ ii. $\frac{1}{2} - \frac{1}{5} \div \frac{4}{7}$ iii. $\frac{3}{4} \div \frac{1}{2} + \frac{1}{8}$

iv. $\frac{5}{8} \times 1\frac{1}{2} \div 2\frac{15}{16}$ v. $2\frac{2}{5} \times \frac{9}{10} \div \frac{27}{10}$ vi. $\frac{1}{2} \times 1\frac{3}{5} \div \frac{5}{9}$

09. Simplify.

i. $\frac{4}{5}$ of 100km ii. $\frac{9}{15}$ of Rs.75.00 iii. $\frac{4}{5}$ of $\frac{10}{28}$

10. Simplify.

i. $\frac{7}{15}$ of $\frac{5}{21}$ ii. $\frac{1}{12}$ of $\frac{3}{7}$

iii. $\frac{7}{15}$ of $\left(\frac{1}{5}+\frac{3}{7}\right)$ iv. . $\left(\frac{3}{7}-\frac{7}{8}\right)$ of 28

11. Simplify.

i. $\left(\frac{3}{3}\times\frac{2}{5}\right)\div\left(\frac{3}{5}+\frac{3}{10}\right)$ ii. $\left(\frac{3}{5}+\frac{7}{10}\right)\div\left(\frac{3}{10}+\frac{7}{20}\right)$ iii. $\left(\frac{3}{7}\times\frac{7}{8}\right)\div 15$

12. a) $\frac{3}{4}$ of a container has been filled with oil. $\frac{1}{2}$ of the volume of oil has been used.

What is the remained portion of oil in the container?

b) A person gave $\frac{1}{2}$ of his money to his wife and $\frac{1}{5}$ to his son. He decided to give remaining portion to his daughter.

i. Express the amount received by the daughter as a fraction

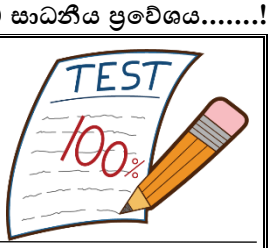
ii. if the amount received by the daughter is Rs. 60000, find the total amount of money which father had.

13. Betel leaves have been cultivated in $\frac{1}{3}$ of a land and Banana in $\frac{1}{2}$ of the remaining land.

i. How much is the remaining land after cultivating the betel leaves?

ii. Express the area of a land used to cultivate banana as fraction of the whole land.

iii. Express the area of the remaining land as a fraction of the whole land after cultivating banana and betel leaf cultivation.



❖ Past paper questions (Fractions)

01. i. Simplify $\frac{3}{7} \div 1\frac{4}{5}$

ii. Simplify $\left(\frac{2}{3}+\frac{1}{4}\right) \times \frac{4}{7}$

Kamal travel $\frac{1}{2}$ of the Journey by bus and $\frac{1}{3}$ of the remain by train.

iii. Find the distance travel by train as fraction of the whole journey.

iv. The rest of the journey is travel by a three wheeler. Find the distance travel by three wheeler as fraction.

02. Nimal went $\frac{4}{5}$ of his journey by Train and $\frac{2}{3}$ of remaining by bus and he went the rest 2km by a three wheeler.

i. What fraction he travelled by bus out of the total distance he travelled.

ii. What fraction which he travelled by train and bus of his journey.

iii. What fraction which he travelled by three-wheeler of his journey.

iv. Find the total distance he travels in kilometers.

03. A man spends $\frac{1}{3}$ of his salary for food and $\frac{1}{4}$ of its salary for house rent.

i. What fraction of the whole salary is spend for food and for house rent?

ii. After spending for food and house rent $\frac{3}{5}$ of the remaining is spent for other expenses. What fraction of the whole salary is spent for other expenses?

iii. After all the expenses mentioned above, if he deposits the remaining amount in a bank, what fraction of the salary is deposited?

iv. If the amount he deposited in the bank is Rs. 6 000, how much is his monthly salary?

04. i. If a man spends $\frac{1}{4}$ of his salary for food, find the remaining fraction of his salary.

ii. $\frac{1}{3}$ of the remaining is spend for education. what fraction of the whole salary is spend for education?

iii. What fraction of the whole salary is spent for food and education?

vi. After all the expenses mentioned above, if he deposits the remaining amount in a bank and it is Rs 20,000, how much is his monthly salary?

05. Nimal gave $\frac{1}{2}$ of his 12ha land. $\frac{1}{3}$ to his son and of his daughter .

i. What fraction of the total land was received by son and daughter

ii. Express the remaining portion of the land as a fraction of whole land?

iii. Nimal gave $\frac{1}{2}$ of the remaining portion of the land to his brother. How many hectares received his brother.

06. A person gives $\frac{1}{3}$ of his money to his wife, half of the remaining to his two children equally. Donated $\frac{1}{4}$ of remaining money is given for charity

i. What is the money received by one child from the whole amount?

ii . Which amount of money is given to the Charity from the whole amount?

iii.. If the amount of money given to the charity is Rs.1000. find the whole amount.

Grade 9 **Mathematics** **Unit – 04**

04. Percentages

01. Find the profit / loss on sale of each of the following.

i. By selling a bag bought for Rs.600 for Rs.800

ii. By selling a TV bought for Rs.15,000 for Rs.20,000

iii. By selling a table bought for Rs.9000 for Rs.6500

iv. By selling a computer bought for Rs 35,000 for Rs 25,000

v. By selling a washing machine bought for Rs.145,000 for Rs.165,000

vi. By selling a refrigerator bought for Rs 100,000 for Rs 75,000

02. Find the price at which it should be sold given the expected profit from selling each of the following.

i. The purchase price of an item is Rs.1000. At what price should he sell it if he expects to make a profit of Rs 750 by selling it?

ii. The production cost of an item is 500 rupees. If a profit of 7500 rupees is expected from the sale of 50 such items, what is the price at which one item should be sold?

03. Find the profit/loss percentage from selling each of the following.

i. The value of an electric scooter is 250 000 rupees. Find the percentage of loss on sale for Rs.200 000 due to an error.

ii. A jeweler purchases a gold ring for Rs 25,000 and sells it for Rs 28,750. Find His profit and the profit percentage

iii. The price of a computer is 55,000 rupees. Find the profit percentage on selling this for Rs.66,000.

iv. Find the profit percentage of an item sold at Rs 600, which is bought at the price of Rs 500

v. A trader bought 500 rambutan nuts at 5 rupees each and removed 100 of them due to spoilage and sold the rest at 8 rupees each.

vi. A baker makes 120 cupcakes at a cost of Rs 15 per cupcake. Unfortunately, 20 cupcakes get burnt and cannot be sold. He sells the remaining cupcakes at Rs 20 each. Find out if the baker earns a profit or incurs a loss and its percentage.

vii. A bookshop owner buys 80 books at Rs 150 per book. Due to damage, 5 books become unsellable. He sells the remaining books at Rs 180 each. Calculate the profit or loss percentage.

viii. A merchant purchases 200 kg of rice at Rs 240 per kg. He repacks them into smaller packets and sells the entire stock at Rs 255 per kg. However, 10 kg of rice is wasted due to spillage. Determine the profit or loss and its percentage.

04. Find the selling price of each of the following.

i. The production cost of an item is 1500 rupees. Find the price at which the product should be sold if a profit of 30% is expected from its sale.

ii. The price of a new TV is Rs $55{,}500$. Find the price at which the television should be sold if a profit of 40% is expected on its sale.

iii. If 10% profit percentage can earn by selling an item for Rs 6600. Calculate its purchase price

05. A merchant incurs a loss of 8% by selling a dining table for Rs 184 000. Determine its purchase price

06. A shopkeeper earns a profit of 15% by selling a washing machine for Rs 46,000. Calculate its purchase price

07. A laptop worth Rs 250,000 is sold at a loss of 12%. Calculate its selling price.

08. A sofa set worth Rs 30,000 is sold at a loss of 8%. Determine its selling price.

09. A gold necklace worth Rs 75,000 is sold at a loss of 5%. Find its selling price.

10. A vendor sells a smartwatch at a profit of 30%. If the cost price is Rs 2,500, find its selling price.

11. A trader earns a profit of 18% by selling a jacket worth Rs 2,200. Calculate its selling price.

12. A shopkeeper sells a wooden chair at a profit of 12%. If the cost price of the chair is Rs 4,500, determine the selling price.

13. Find the purchase prices of the followings
    i. Selling a washing machine for Rs $45{,}500$ makes a profit of 25%.

    ii. Selling a computer for Rs 50,000 makes a loss of 20%.

14. A discount of 15% is offered when a washing machine marked at Rs 90,000 is purchased
    i. How much discount is given?

    ii. What is the selling price of the washing machine?

15. A shopkeeper offers a discount of 20% on a sofa set with a marked price of Rs 45,000.
    i. How much is the discount ?

    ii. Find the selling price of the sofa set.

16. Rohan buys a jacket worth Rs 2,500 and a pair of shoes worth Rs 3,000 from a store that offers a 10% discount. How much does Rohan have to pay for both items?

17. Priya purchases a handbag for Rs 2,000 and a pair of sunglasses for Rs 1,500 from a shop offering an 8% discount. Find the total amount Priya has to pay

18. Sohan buys a laptop for Rs 245,000 from a shop that offers a 5% discount. Calculate the amount Sohan has to pay.

19. Ravi buys a smartphone worth RS.18,500 and a smartwatch worth RS.6,500 from a store offering a 12% discount on the total bill. How much does Ravi have to pay?

20. A real estate agent charged Rs 50,000 as commission for selling a house worth Rs 2,000,000. Calculate the commission percentage he charged.

21. A car dealer earned a commission of Rs 15,000 for selling a car worth Rs 500,000. Find the commission percentage.

22. A jeweler charged Rs 12,000 as commission for selling a diamond necklace worth Rs 240,000. Determine the commission percentage

23. A house owner sells his apartment and is left with Rs 2,450,000 after paying Rs 50,000 to the broker.
    i. What is the selling price of the apartment?

    ii. What is the commission percentage charged by the broker?

24. A person sells his motorcycle and is left with Rs 180,000 after paying Rs 20,000 as commission to the agent.
    i. What is the selling price of the motorcycle?

    ii. What is the commission percentage charged by the agent?

25. A businessman paid a commission of 2.5% when he purchased a warehouse. If he paid Rs 75,000 as commission, find the total amount he paid for the warehouse.

26. A buyer paid a 4% commission when purchasing a piece of land. If the commission amounted to Rs 32,000, determine the total price he paid for the land.

27. A property dealer charges a 1.5% commission on the sale of a commercial property. If the commission paid was Rs.15,000, find the total sale value of the property.

28. A real estate agent charges a 2% commission on the sale of a car. If the commission paid was Rs.18,000, find the selling price of the car.

29. An agent helps sell a business and charges a 2.5% commission. If the commission paid is Rs.37,500, find the total sale price of the business

❖ Past paper questions (Percentages)

01. a. Kumar buys a coconut at the price of Rs. 28 per coconut and sells at the price of Rs 38 per coconut.

i. Find the profit earned by selling one coconut.

ii. Find the profit percentage.

iii. If Kumar sells 100 coconuts per a day, find the total income which he receives in a month.

iv. "The number of coconut can't change the profit percentage" prove this statement by use examples.

b. Due to immature coconuts, Kumar plans to sell each coconut at the price decreasing by Rs. 3.50. Find the discount percentage offered.

02. a. Price of a bicycle is Rs.3000/=

i. If price increased by 10% find the new price

ii. If price decreased by 10% find the new price.

b. A vendor marks price of a television keeping 40% profit. When purchasing it outright vendor gives 10% discount. Outright price of a television is Rs.50,400/=

i. Find the marked price of the television.

ii. Calculate the discount given.

iii. Find the purchasing price of television by the vendor.

iv. Find the net profit.

c. 3% Commission is given when selling a motor vehicle for Rs.3,000,000/=.

i. Find the commission.

ii. Find the amount received by the owner from the transaction

03. (a) The production cost of a cupboard is Rs. 31 250. The producer obtains Rs. 4 750 profit by selling the cupboard to a trader.

a. What is the buying price of the cupboard by trader? (02 marks)

b. The trader mark the price of the cupboard by keeping 20% profit, What is the marked price of the cupboard? (03 marks)

c. When selling the cupboard Rs. 2 100 discount is given, what is the discount percentage given? (03 marks)

(d) What is the buying price of shirt which sold to Rs. 1320 with a 10% profit? (03 marks)

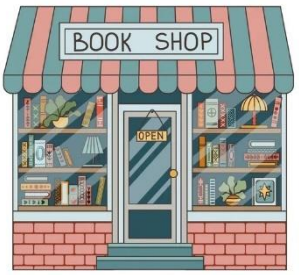
04. A carpenter spends Rs. 9000/= in producing a table. He sells the table to a vender at a profit of 20%. The vender marks the price of the table at a profit of 25%

(i) How much does the vender spend to buy the table ?

(ii) Find the marked price of the table?

(iii) When selling the table, the vender offered a 5% discount to the customer. How much needs to be paid when purchasing the table?

05. (a) If a vender earns a profit of 15% by selling goods at the price of Rs.6440. Find the price at Which the vender brought the goods.



(b)

A book shop	**B book shop**
A discount of 10% on All purchases of books.	A reduction of Rs.200 on all Purchase of value greater than Rs.2000.

I. How much is needed to be paid by Hemali when purchasing books of price Rs.3000 From A book shop?

II. How much is needed to be paid by Achini when purchasing a book of price Rs.2500 From B book shop?

III. How much is needed to be paid by Achini when purchasing a same book from A Book shop.

IV. Is it more beneficial for the Achini to buy books from shop A or from shop B?

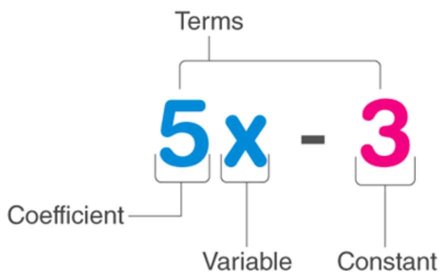
Grade 9

Mathematics

Unit – 05

ALGEBRAIC EXPRESSIONS

05. Algebraic expressions



01. Simplify.

i. $5(x+1)$ ii. $2(3m+2)$

iv. $-3(a+1)$ v. $4(-9m+7)$ vi. $-6(-4x-7)$

02. When $x = 5$ & $y = -2$, Find the value of the following expressions.

i. $4x + y$ ii. $2x - 3y$ iii. $9x - 2y$

03. Simplify.

i. $3(x+2) - 2(x-y)$ ii. $-3(2a+y) + 2(3a-y)$

iii. $-2(x-2) - (2x-y)$ iv. $4(3x+y) - 2(x-4y)$

v. $5(x-6) - (x-4y)$ iv. $-4(x+2y) - 2(2x+y)$

04. When $x = \frac{1}{2}$, Find the value of the following expressions.

i. $2x$ ii. $6x$ iii. $-12x$

05. When $a = \frac{1}{2}$ & $b = -\frac{2}{3}$, Find the value of the following expressions.

i. $a + 3b$ ii. $3b - 2a$ iii. $-4a + 3b$

06. Simplify.

i. $(x + 1)(x + 3)$ ii. $(x + 2)(x - 5)$ iii. $(x - 2)(x + 5)$

iv. $(y - 3)(y - 7)$ v. $(p + 4)(p - 2)$ vi. $(a - 3)(a + 2)$

vii. $(3 - a)(2 - a)$ viii. $(5 + x)(6 - x)$ ix. $(4 - y)(5 + y)$

07. $(x+2)(x+7) = x^2 + 9x + 14$ Verify this expression For each of the following cases

i. $x = -1$ ii. $x = 4$

08. $(x-4)(x+3) = x^2 - x - 12$ Verify this expression For each of the following cases

i. $x = 0$ ii. $x = -2$

09. Find the values of a & b.

i. $(x+a)(x+5) = x^2 + bx + 15$ ii. $(x-a)(x+4) = x^2 - bx + 12$

10. The length of a rectangle is 4 cm more than its width. If its width is x cm,

    i. Find the area of the rectangle.

    ii. Find the area of the new rectangle when the length and width are increased by 5 cm each.

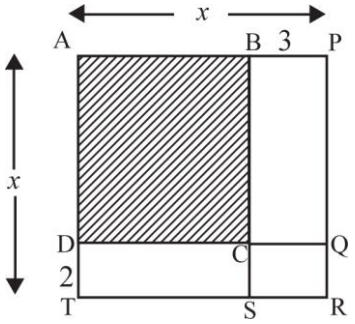
    iii. Find the area of the second rectangle if x=6 cm.

11. Length of a rectangle is l and width is b. when Increase its length by 4 units and its width decrease by 2 units . Write an expression for the area of the new rectangle.

12. The length and breadth of a rectangular sheet of craft paper are 20 cm and 12 cm respectively. Two strips of equal width **x** cm (with $x<12$) are cut off—one from the length and one from the breadth. Using a figure, obtain an expression for the area of the remaining portion.

❖ Past paper questions (Algebraic expression)

01. i. Write an expression for perimeter of the shaded part of the figure given bellow.

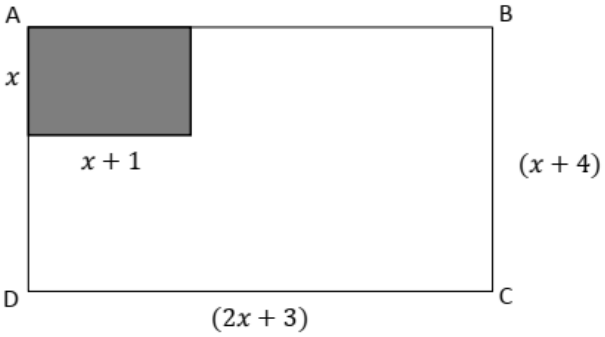


ii. Write an expression for area of the shaded part of the figure .

iii. If x= 8 cm, find the area and perimeter of shaded part separately .

02. From the given figure cut off the coloured area from ABCD rectangular lamina.

i. Write the expression and expand it for the area of the ABCD Rectangular lamina.



ii. Write the expression and expand it to the coloured area.

iii. Determine the algebraic expression for the remaining part of the rectangular lamina.

03. (i) Expand and simplify

$$3(a-b) - 4(2a+b)$$

(ii) The figure of a large rectangle which is composed of four sections given below has used to expand (x+2) (x+1). Fill in the blanks using it.

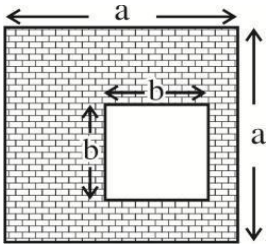
$(x+2)(x+1) = x^2 + \ldots\ldots\ldots\ldots + 1x + 2$

$= x^2 + \ldots\ldots\ldots\ldots + 2$

	x	2
x	x^2	.....
	$1x$	2

1

(iii). Write an expression for the shaded area in the given figure, and find the factors.



(iv). Write the following algebraic expression as a product of factors

$4a - 8a^2b - 16ab$

04. There is a square shaped land and a road with 6m width is situated along the 2 adjacent sides of the land.

a. If the length of a side a square land is X meters. Draw a sketch diagram to show above information.

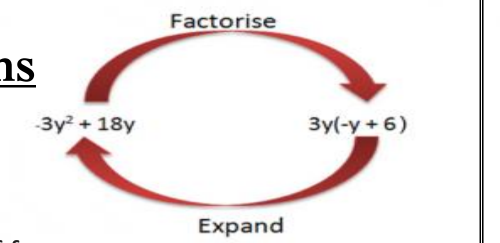
b. Show that the area of the land with road is $X^2 + 12X + 36$

c. Simplify the following expressions

i. $X^2 + 2X + 4X + 8$ ii. (3+X) (6-X)

Grade 9   **Mathematics**   Unit – 06

06. Factors of Algebraic Expressions



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

i. $12x + 24$ ii. $3a + 9b$ iii. $12x + 36xy$

iv. $10a - 30b$ v. $2pq - 4q^2$ vi. $18k^2 - 2k$

vii. $2a + 4b - 8$ viii. $18a - 4b + 12$ ix. $12 - 2b - 6c$

x. $3x + 12y + 24$ xi. $15a^2 - 30ab$ xii. $10y^2 - 25y$

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

i. $ab + ac + 2b + 2c$ ii. $p^2 - pq + 3pr - 3qr$

iii. $ax - ay - bx + by$ iv. $pr + pt - qr - qt$

v. $2pq + 6ps - sq - 15s$ vi. $x^2 + 2xy - 3x - 6y$

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

i. $x(x+3)-5(x+3)$ ii. $a(a+4)-2(a+4)$

iii. $y(a-2)-4(a-2)$ iv. $a(x-1)-3(x-1)$

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

i. a^2+5a+6 ii. y^2+6y+5 iii. $x^2+10x+21$

iv. $x^2-2x-35$ v. p^2-p-30 vi. $a^2-5a-24$

vii. $y^2+4y-21$ viii. a^2+4a-5 ix. x^2+x-6

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

i. $x^2 + 7x + 12$ ii. $y^2 + 4y + 3$ iii. $x^2 + 2x + 1$

iv. $x^2 - 4x - 32$ v. $x^2 - x - 20$ vi. $p^2 + 5p - 14$

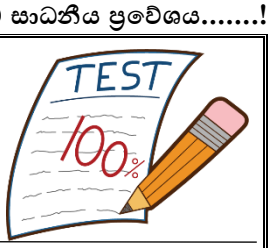
06. Write each of the following algebraic expressions as a product of factors

i. $a^2 - b^2$ ii. $x^2 - y^2$ iii. $x^2 - 4$

iv. $y^2 - 1$ v. $4x^2 - 9$ vi. $25x^2 - 49$

vii. $9x^2 - 4y^2$ viii. $1 - 9x^2y^2$ ix. $a^2b^2 - 25c^2$

x. $25x^2 - y^2$ xi. $100 - 81x^2$ xii. $49x^2 - 81y^2$



❖ Past paper questions (Factors of Algebraic expression)

01. (a). Find the value of the expression when x = (-2) and y = 3

i. $2x$ - 3y

ii. $\frac{x}{2} - \frac{y}{3}$

(b). Factorize.

i. $2x^2$ - $7x$ + 6

ii. $6x^2$ + $2y^2$ - $4x$y - $3x$y

iii. Factorize and find the value. $103^2 - 3^2$

02. Length of a rectangle plate is (x + 5) and breadth is (x + 3), then three units reduced from its length and 4 units reduced from its breadth to create a new rectangle plate.

i. Write an expression to length of new rectangle plate.

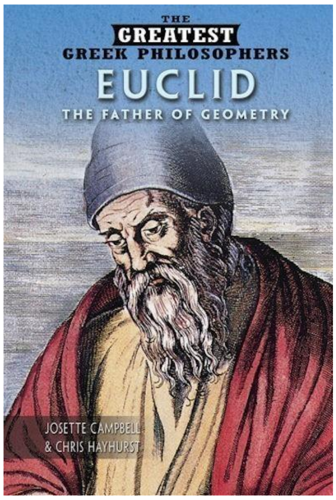
ii. Write an expression to breadth of new rectangle plate.

iv. Construct an expression to find the **Area of previous rectangle** by using knowledge of factor expand and simplify.

v. Find the **Area of removed plate** by using part iii, iv.

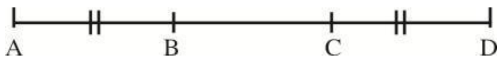
Grade 9 **Mathematics** Unit – 07

07 . Axioms



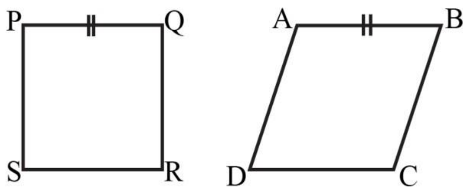
01. Write five common axioms.

02. If AB = CD in the given figure, show that " AC = BD.

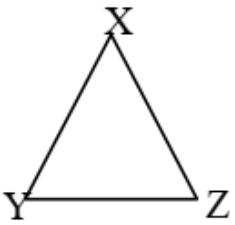


03. Perimeter of both PQRS square and ABCD rhombus are equal.

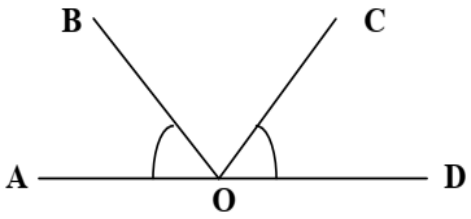
If PQ = 6cm. Find the perimeter of ABCD rhombus.



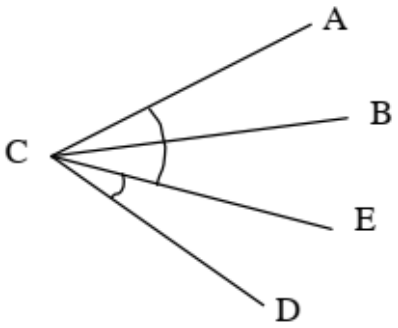
04. . In the figure, XY = XZ and XZ = YZ. If XY = 8cm, find the perimeter of XYZ triangle.



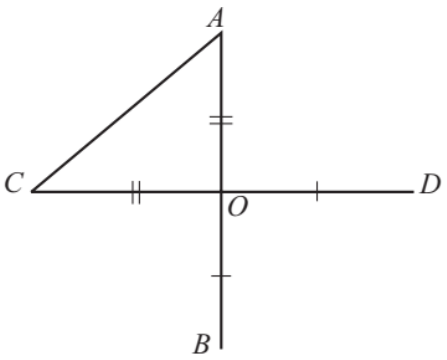
05. If $A\hat{O}B = C\hat{O}D$ Write an angle which is equal to $A\hat{O}B$



06. In this given figure, $A\hat{C}E = B\hat{C}D$ Show that $A\hat{C}B = E\hat{C}D$



07. Fill in the blanks of the following proof



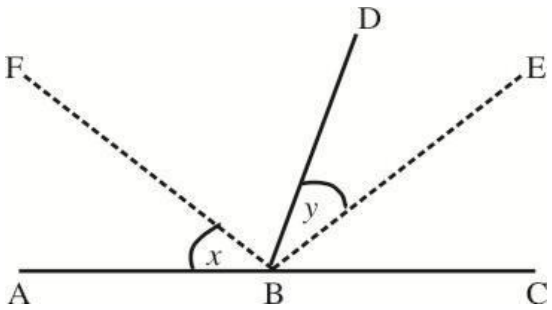
AO = OC

OB = OD

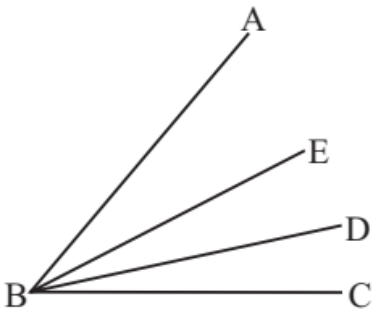
AO + OB = OC + ...

AB = ...

08. Bisectors of A$\hat{B}$D and D$\hat{B}$C are BF and BE respectively, Find the value of F$\hat{B}$E

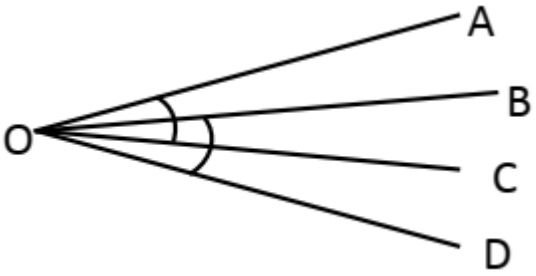


09. If $A\hat{B}E = C\hat{B}D$ show that $A\hat{B}D = C\hat{B}E$

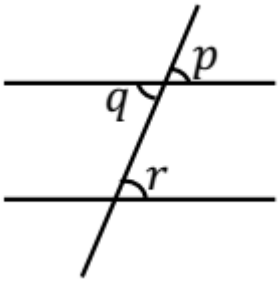


❖ Past paper questions (Axioms)

01. i. In the given figure if $A\hat{O}C = B\hat{O}D$, Show that $A\hat{O}B = C\hat{O}D$



ii. In the given figure if p = r ; show that q = r



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English Medium Mathematics, English Medium Mathematics, English Medium Mathematics, English Medium Mathematics, English Medium

Grade 9

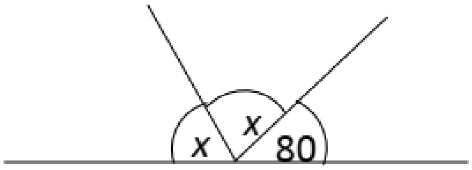
Mathematics

Unit – 08

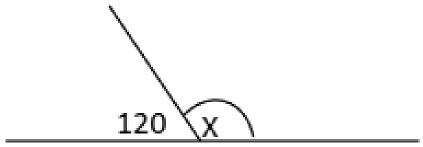
08.Angles related to straight lines and parallel lines

01. Based on the information given in each of the figures shown below, find the value of each English letter representing an angle.

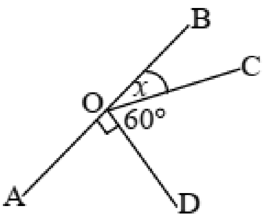
i.



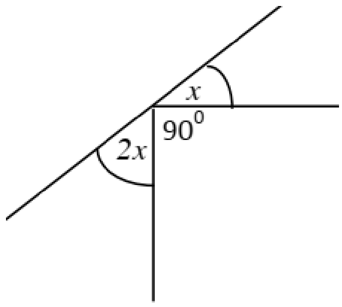
ii.



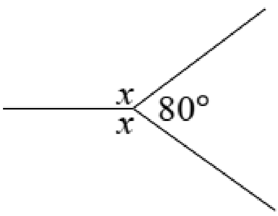
iii.



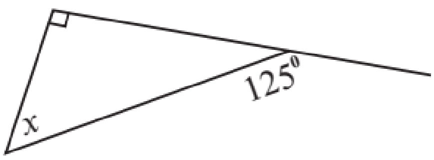
iv.



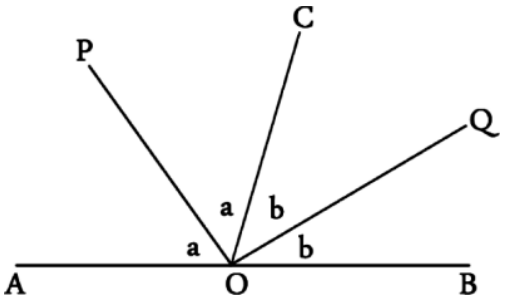
v.



vi.



02. In the figure OP bisected $A\hat{O}C$ and OQ bisected $C\hat{O}B$. Show that $P\hat{O}Q=90^0$

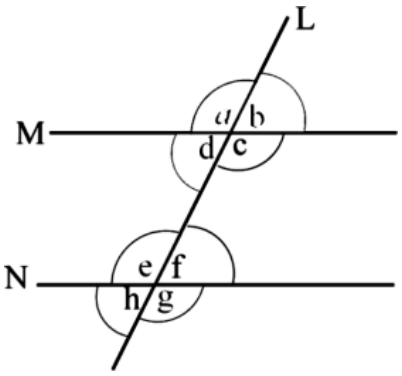


03. In the figure, L, M and N are straight lines. a ,b ,c ,d ,e ,f ,g and h are the angles.

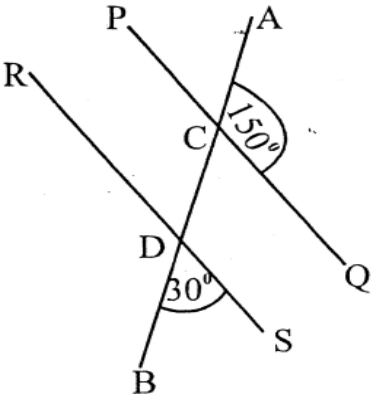
Name, i. pairs of alternate angles

ii. pairs of corresponding angles

iii. pairs of allied angles

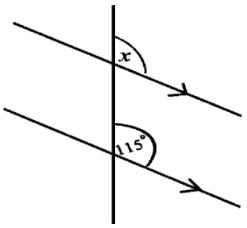


04. According to the data given in the figure are the lines PQ and RS parallel to each other? Give reasons

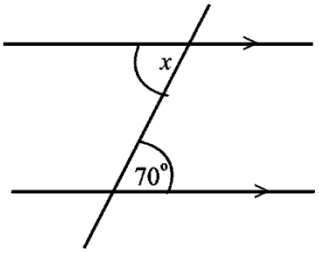


05. Based on the information given in each of the figures shown below, find the value of each English letter representing an angle.

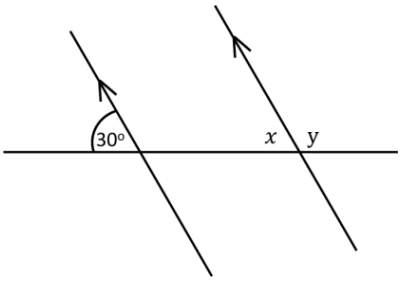
i.



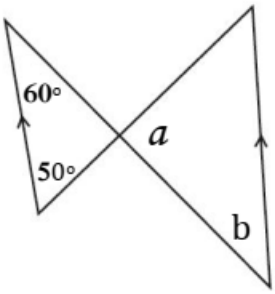
ii.



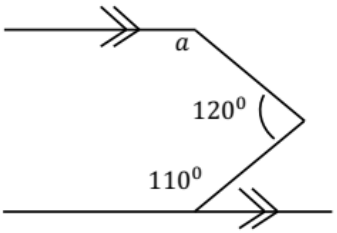
iii.



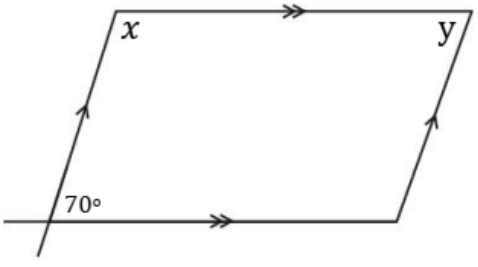
iv.



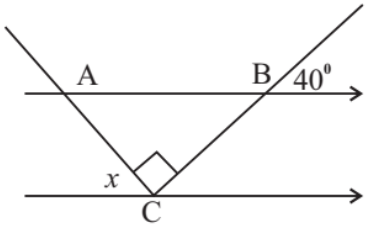
v.

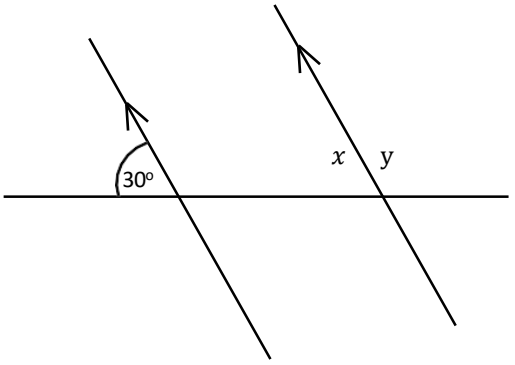


vi.



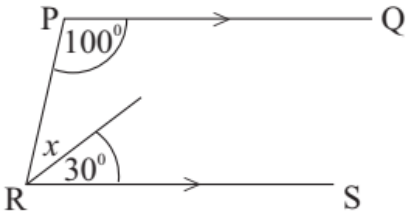
06. Find the magnitude of the x and y





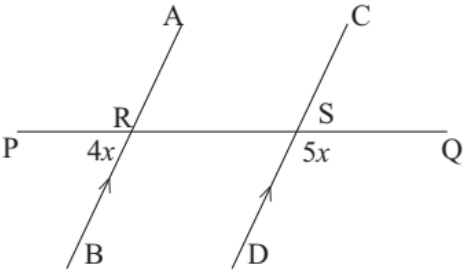
07. Find the value of *x*

Write the theorem related to above

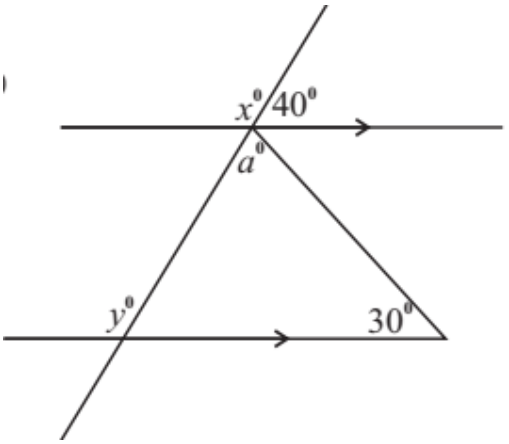


08. (i) Find P$\hat{R}$B

(ii) Show that P$\hat{R}$B = C$\hat{S}$Q



09. Using the data of given diagram

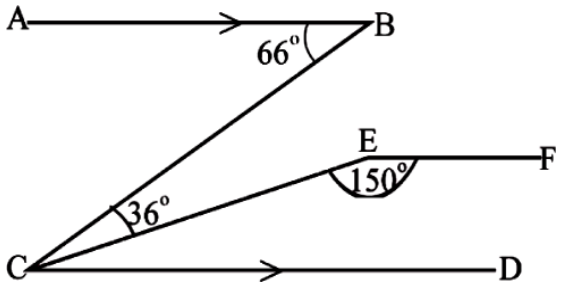


i. Find the value of *x* and given the reason.

ii. Find the value of *y.*

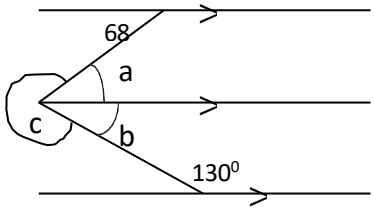
iii. Find the value *a.*

10. From the information shown in the figure, show that straight lines AB and EF are parallel.

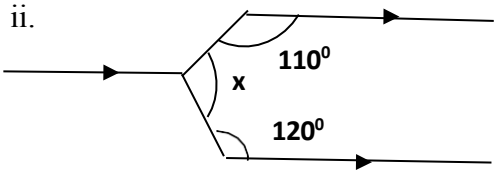


11. Based on the information given in each of the figures shown below, find the value of each English letter representing an angle.

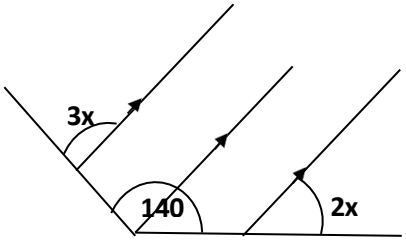
i.



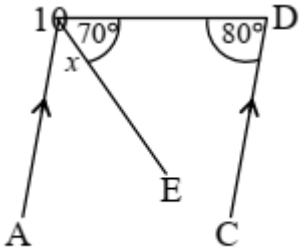
ii.



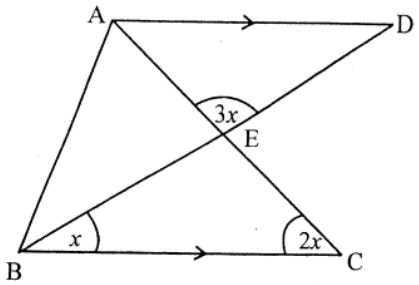
iii.



iv.



12. Using the information in the figure,

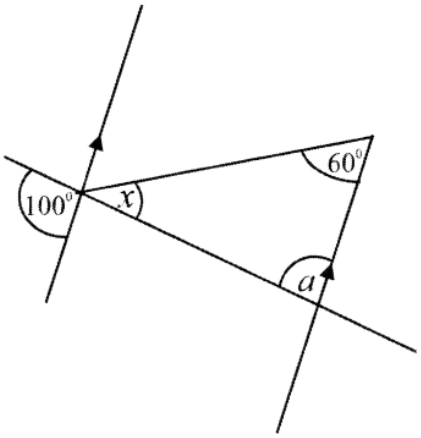


i. Name 2 pairs of alternate angles.

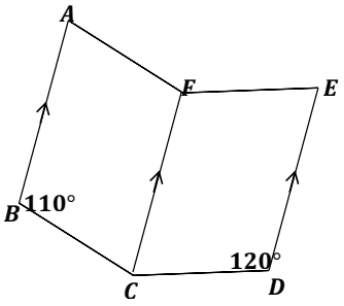
ii. Find the value of x.

iii. If $A\hat{B}D = D\hat{B}C$,find the value of $B\hat{A}D$

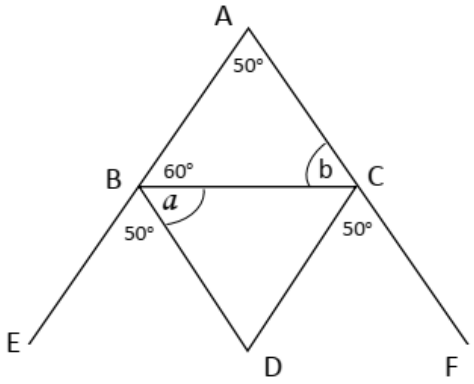
13. Find the value of a and x according to the figure



14. Find the magnitude of B$\hat{C}$D



15. Find the magnitude of *a* and b , If BD//AC Show that AB//DC



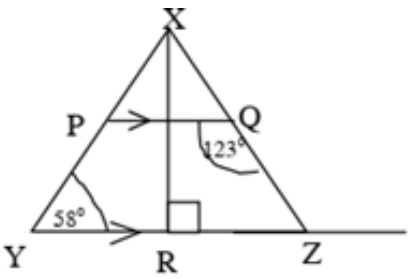
16. The diagram shows the triangle XYZ, PQ // YZ and XR perpendicular to YZ , if PQZ =123^0 and PYZ=58^0 By giving reasons,

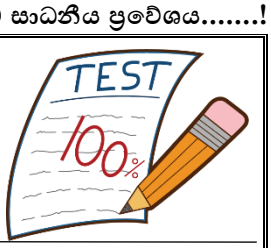
i. Find $X\hat{P}Q$

ii. Find $Y\hat{Z}X$

iii. Find $P\hat{X}Q$

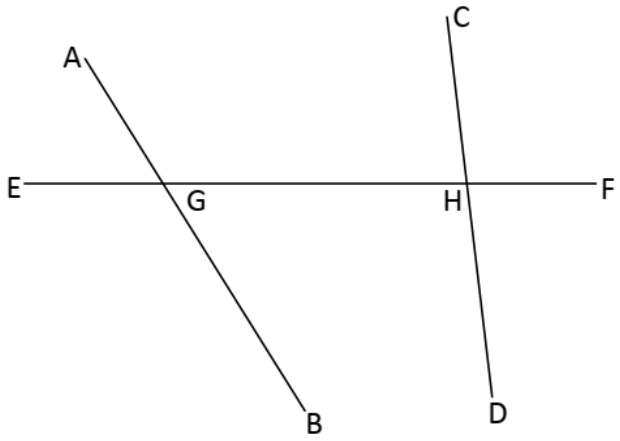
iv. Write a pair of supplementary angles.





❖ Past paper questions

01. AB, CD and EF are three straight lines.



i) Name a straight line that can be taken as a transversal. (01 marks)

ii) What are the two straight lines which are intersected by the transversal? (02 marks)

iii) Write down an a alternate angle for $A\hat{G}H$

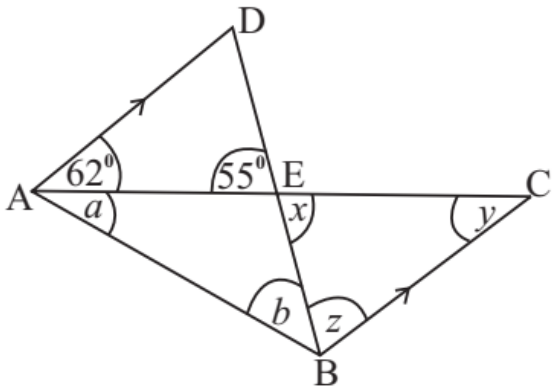
Write down a corresponding angle for $A\hat{G}H$

Write down an allied angle for $A\hat{G}H$. (03 marks)

iv) Draw the figure in the answer sheet when AB and CD are parallel. (02 marks)

v) Write down the relationship of pair of allied angles when AB and CD are parallel. (02 marks)

02. Answer to following questions according to the information in the figure.

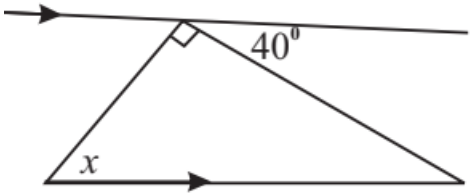


i. By giving reasons find the value of angles *x, y* and *z*.

ii. Write the relationship between angles *x, a* and *b*.

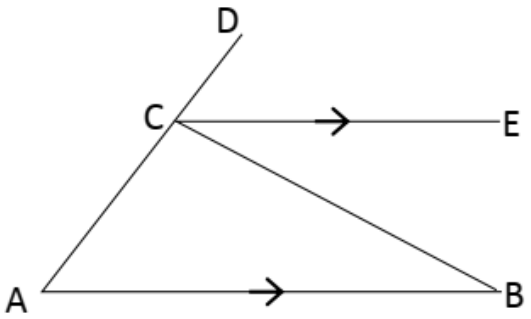
iii. If a = 28^0 , then show that the straight lines AB and BC are perpendicular to each other.

iv. Find the value of ***x*** according to the data given in the diagram.



03. In the triangle ABC, side AC is produced to D and CE is drawn parallel to AB.

(a)



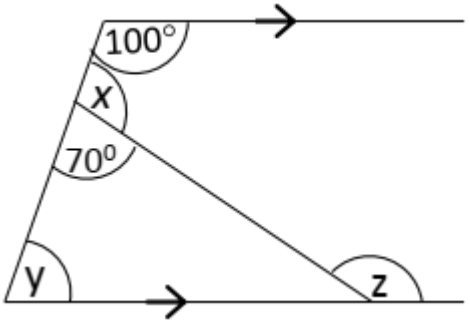
i. Name an angle equal to $A\hat{B}C$. Give reasons.

ii. Name an angle equal to $B\hat{A}C$. Give reasons.

iii. Using axioms show that, $A\hat{B}C + B\hat{A}C = B\hat{C}D$

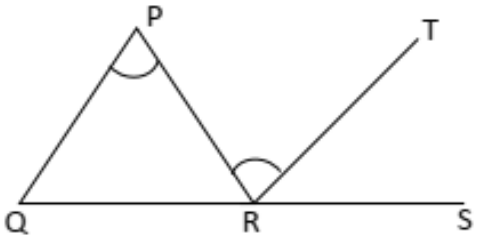
iv. Write down the theorem which is relevant to the result that you have obtained in (iii).

(b) According to the information given in the figure, find the magnitudes of the angles *x*, *y* and *z*.



04. In the following diagram $Q\hat{P}R = P\hat{R}T$

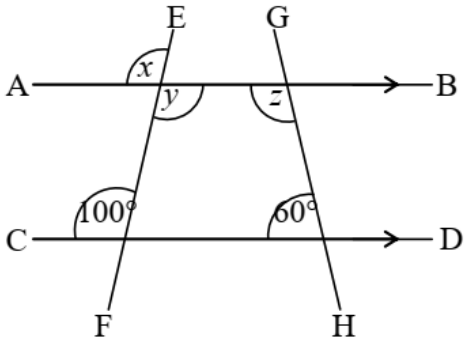
i. Write the relation between straight lines QP and RT, Give the reason.



ii. Write the angle equal to $P\hat{Q}R$

iii. Show that $PRS = P\hat{Q}R + Q\hat{P}R$

05. According to the information given in the figure, answer the following questions.



i. Name the pairs of parallel lines in the figure.

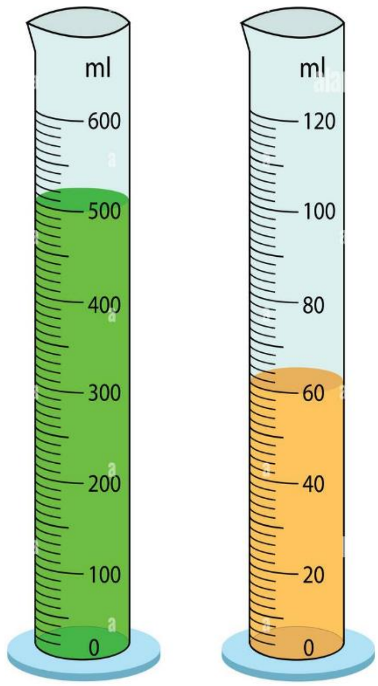
ii. How many straight line segments are there?

iii. Name three relationships between the angles formed by intersecting a pair of parallel lines from a transversal.

iv. Find the magnitude of the angles *x, y* and *z.*

Grade 9 **Mathematics** Unit – 09

09. Liquid Measurements



01. Complete the table given below

ml	l and ml	l (in decimal form)
1800	…………..	1.8
…………..	2 l 250 ml	2.25
4250	…………..	…………..
…………..	5 l 100 ml	5.1
…………..	0 l 750 ml	…………..
600	…………..	0.6
90	0 l 090 ml	…………..
…………..	3 l 475 ml	…………..
…………...	0 l 040 ml	0.04
…………..	…………..	0.008

02. Length, width, height of a container is 10cm, 5 cm, 3 cm respectively, So find the volume of the container.

03. A cube has a side length of 4 cm. Find its volume

04. The volume of a cube is 125 cm^3. Find the length of one side of the cube.

05. A cube has a volume of 27 cm^3. Find the total surface area of the cube.

06. A cuboid has a volume of 180 cm^3. If its height is 5 cm and width is 6 cm, find its length.

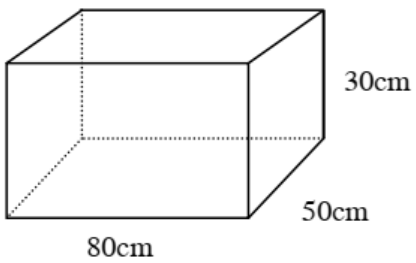
07. The length, width, and height of a cuboid are in the ratio 2:3:4. If its volume is 192 cm^3, find the dimensions of the cuboid.

08. A cuboid has a length of 10 cm, and its volume is 360 cm^3. If the width and height are equal, find the width and height.

09. The length, width and height of a fish tank are 80cm, 50cm, 30cm respectively.

(i) Find the volume of the tank.

(ii) Express the capacity of the tank in liters.



(iii) How many times should pour water to fill the above tank by a vessel of 2/ capacity.

10. The length, breadth and height of a certain water tank are 10m, 8m, and 4m respectively.

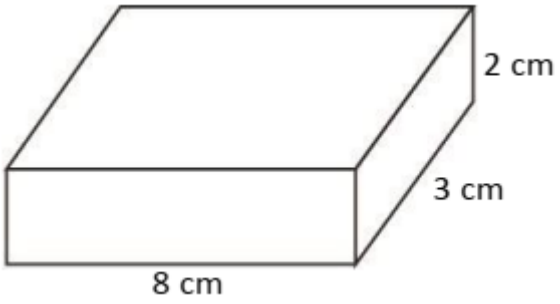
i. Find the capacity of the tank in liters.

ii. Determine the capacity in liters in the water tank if the tank is filled with water only up to a height 1.5m.

iii. Determine the volume of water required to fill the whole tank.

iv. The volume of water already filled in the tank poured into cuboid shaped tank with base area of $60m^2$. Find the height of the water in the cuboid shaped tank.

v. Find the capacity in milliliters



11. A cuboid shaped water tank has a rectangle base of area $24m^2$ and 3m height

i. Find its' capacity in ł

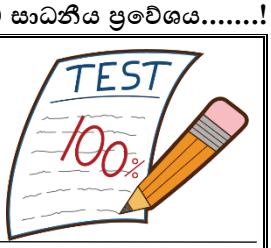
ii. When a tap from the water tank constant rate of 200 ł per minute. Determine how long after tap is opened the tank become empty

12. The length, width and the height of a water tank in a house are 1.5 m, 1 m and 1 m respectively.

i. What is the volume of the tank in cubic meters?

ii. What is the capacity of the tank in Liters?

iii. If a member of that family uses about 100l of water per day, for how many days will the amount of water in this tank be enough for a home of five members?



❖ Past paper questions (Liquid Measurements)

01. (a) A cup contains 0. 72l of medicinal syrup. A cuboidal shaped container with length, breadth and height equal to 8cm, 5cm and 6cm respectively is completely filled by the certain amount of medicinal syrup in the cup. The remaining amount of the syrup in the cup was poured into a cuboid shaped container which has a square base of area 120cm^2.

(i) Find the volume of the cuboidal shaped container with length, breadth and height equal to 8cm, 5cm and 6cm respectively in millilitres. (2 marks)

(ii) Find the volume of syrup which was poured in to the cuboidal shaped container with base area 120cm^2 in millilitres. (2 marks)

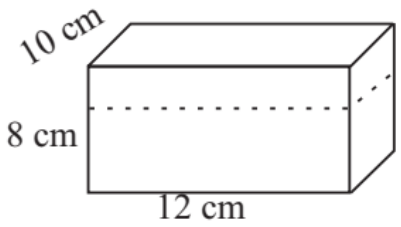
(iii) When the remaining amount of the syrup was poured in to the cuboidal shaped container of base area 120cm^2, find the height of the syrup in the container. (2 marks)

(b) The length, breadth and height of a cuboidal shaped container are 3m, 1.5m and 0.7m respectively. Find the capacity of the container.

(i) in cubic meters.

(ii) in litres. (4 marks)

02. A vessel formed by plastic of transparent which length 12cm, breadth 10cm and height 8cm is filled with liquid of blue colour and formed a fancy item.



i. Find the capacity of the vessel.

Ii . If liquid is filled up to 7cm. find the volume of liquid in the vessel

iii. If the liquid is in bottle of 125ml, then how many bottles

iv. If the price of one bottle is Rs. 80, find the amount spend to prepare item (iii) above.

v.If the vessel kept taking smallest face as the base then what is the height of liquid.

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03.(a) In a cuboid shaped tank area of the base is 30m^2 and height is 6m.

i. Find the capacity of the tank in liters.

ii. If $\frac{2}{3}$ of the tank is filled with water, find the height of the water level.

iii. Find the volume of the water in the tank.

iv. If 300*l* of water is removed per minute, find the time taken to make the tank empty.

(b) Length, breadth and height of cuboidal tank is 3m, 2m and 1m respectively.

(i) Find the capacity of the above tank in liters.

(ii) Find amount of water required for a cultivated land of 20 m^2 where 20 l required for 1 m^2 per day.

(iii) Find how many days the amount of water in the tank is sufficient to the cultivated land.