Name: $\qquad$ Std. : $\qquad$ Roll No. : $\qquad$ Date : $\qquad$

## GEOMETRIC CONSTRUCTION - 3

Learning Focus: - Identifying the Parts of a Triangle

- Construction of a Triangle when the measures of the three Sides are given.
(This worksheet relates to Lesson 1 of your Math textbook)
I. - Octy wants you to look at the Triangles in the pictures.
- Then, fill in the boxes in the Table. - See the example.

| Name of the Triangle | Names of the Sides <br> of the Triangle |  | Names of the Angles <br> of the Triangle |  |  |  |
| :---: | :---: | :--- | :--- | :--- | :--- | :--- |
| $\triangle \mathrm{JOY}$ | JO |  |  | $\angle \mathrm{JOY}$ |  |  |
|  |  |  |  |  |  |  |

## AIM: To construct a triangle when its three sides are given.


II.A. - Look at the following example and follow the Steps carefully.

Draw $\triangle C R M$ such that $\ell(C R)=4 \mathrm{~cm}, \ell(C M)=3 \mathrm{~cm}$ and $\ell(R M)=3.2 \mathrm{~cm}$.


## Construction:

## PREPARATION:

Draw a rough diagram of the triangle and write the measures of its sides.

## STEP I:

Using a ruler, draw eeg CR of length 4 cm .
STEP II:
Place your compass on point C , and draw an arc with radius 3 cm .

## STEP III:

Place your compass on point R , and draw another arc with radius 3.2 cm . Name the point of intersection of the 2 arcs, M .

## STEP IV:

Using your ruler, draw seq CM and see RM.
[ Note: Either of the 2 arcs can be drawn first, but be careful to take the correct measurement of each arc.]
II.B. - Now, Octy wants you to follow the example given in Ex. II.A. to draw the Triangles below, with the given measures of their three sides.
(a) Draw $\triangle$ SAT such that $\ell(S A)=8 \mathrm{~cm}, \ell(\mathrm{AT})=5.5 \mathrm{~cm}$ and $\ell(\mathrm{ST})=7 \mathrm{~cm}$.

I have discovered that the triangle that I have constructed is (a right-angled triangle/ an acute-angled triangle)
$* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *$
(b) Draw $\triangle \mathrm{CMY}$ such that $\ell(\mathrm{CM})=5 \mathrm{~cm}, \ell(\mathrm{MY})=4 \mathrm{~cm}$ and $\ell(\mathrm{CY})=3 \mathrm{~cm}$.

I have discovered that the triangle that I have constructed is (a right-angled triangle/ an acute-angled triangle)

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## CONSTRUCTION OF TRIANGLES

Learning Focus: - Construction of a Triangle :

- when the measures of its two Sides and the included Angle are given
- when the measures of its two Angles and the included Side are given
(This worksheet relates to Lesson 1 of your Math textbook)
AIM: To construct a triangle when the measures of its two Sides and the included Angle are given


## I.A. - Octy wants you to look at the following example and follow the Steps carefully.

Draw $\triangle P V K$ such that $\boldsymbol{\ell}(P V)=6 \mathrm{~cm}, \boldsymbol{\ell}(P K)=4 \mathrm{~cm}$ and $\boldsymbol{m} \angle K P V=30^{\circ}$.

I.B. - Now, follow the Example given in Ex. I.A. to draw the Triangle below, with the given measures of its two sides and the included angle.

Draw $\triangle$ EMS such that $\boldsymbol{\ell}(E M)=5.5 \mathrm{~cm}, \boldsymbol{\ell}(E S)=6.4 \mathrm{~cm}$ and $\boldsymbol{m} \angle \mathrm{SEM}=40^{\circ}$.

AIM: To construct a triangle when the measures of its two Angles and the included Side are given.
II.A. - Octy wants you to look at the following example and follow the Steps carefully.

Draw $\triangle$ STM such that $\boldsymbol{\ell}(S T)=7 \mathrm{~cm}, \boldsymbol{m} \angle \mathrm{MST}=25^{\circ}$. and $\boldsymbol{m} \angle \mathrm{MTS}=35^{\circ}$.


## Construction:

## PREPARATION:

Draw a rough diagram of the triangle and write the measures of its two angles and the including side. STEP I:
Using a ruler, draw seg ST of length 7 cm .
STEP II:
Place your protractor at vertex S on seg ST, measure $25^{\circ}$, and draw a point $Y$ at that position.
Then, with your ruler, draw a ray SY from
vertex S
STEP III:
Place your protractor at vertex T on seg ST, measure $35^{\circ}$, and draw a point $Z$ at that position.
Then, with your ruler, draw a ray TZ from vertex T.
The point at which ray SY and ray TZ intersect is M .
II.B. - Now, follow the Example given in Ex. II.A. to draw a Triangle below, with the given measures of its two Angles and the included Side.
(a) Draw $\triangle$ ADG such that $\boldsymbol{\ell}(\mathrm{AD})=8.5 \mathrm{~cm}, \boldsymbol{m} \angle \mathrm{GAD}=50^{\circ}$. and $\boldsymbol{m} \angle \mathrm{ADG}=45^{\circ}$.

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## OPERATIONS ON RATIONAL NUMBERS - 3

Learning Focus: - Using BODMAS for simplification of expressions
(This worksheet relates to Lesson 5 of your Maths textbook.)

I.A.. - Observe how the example is solved.

## Example:

$5 \times(4+2)+\frac{1}{2}$ of $10-8 \div 2$
$=5 \times 6+\frac{1}{2}$ of $10-8 \div 2$
$=5 \times 6+5-8 \div 2$
$=5 \times 6+5-4$
$=30+5-4$
= $35-4$
$=31$
Ans. 31

1) Brackets: Work out the operation within the brackets.
2) Of : Work out $\frac{1}{2}$ of 10
3) Division: Work that out.
4) Multiplication: Work it out.
5) Addition : So, carry out Addition.
6) Subtraction : Now, Subtract.

If we follow this sequence of operations, we can simplify expressions easily and correctly. This is called the BODMAS Rule.

| $\mathbf{B}$ | $\mathbf{O}$ | $\mathbf{D}$ | $\mathbf{M}$ | $\mathbf{A}$ | $\mathbf{S}$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Complete the <br> operation in <br> the brackets <br> $(\ldots .)$. | Work out the <br> 'of' <br> musing <br> multiplication <br> ' | Work out the <br> division <br> operation | Work out the <br> multiplication <br> operation | Work out the <br> addition <br> operation | Work out the <br> subtraction <br> operation |

With the help of the above example, simplify the following expressions.
Remember if there are no Brackets, start with Division.

| Simplify: (a) $6+(14-2) \div 3 \times 8$ | Simplify: (b) $6 \times 20 \div 4+9-7$ |
| :--- | :--- | :--- |
|  |  |
| Ans. |  |

II. A. - An expression may have different kinds of brackets. To help you to simplify such an expression using the BODMAS Rule, follow the rules given beside the example.

Simplify: $37-[5+\{28-(19-7)\}]$
Solution: $37-[5+\{28-(19-7)\}]$
$=37-[5+\{28-12\}] \quad$ Step I: First remove the innermost brackets '( )'
$=37-[5+16] \quad$ Step II: Then remove the braces or curly brackets ' $\}$ '
$=37-21 \quad$ Step III: Lastly, remove the square brackets '[ ]'
= 16
II. B. - Now, solve the following simplification problems given below.


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INDICES - 1

> | Learning Focus: $\begin{array}{c}\text { - Understanding the concepts of Base and Index } \\ \text { of an indexed number } \\ - \text { Multiplication of indices with the same base: } \\ \mathbf{a}^{m} \times a^{n}=a^{m+n}\end{array}$ |
| :---: |

(This worksheet relates to Lesson 6 of your Maths textbook.)
I. Complete the following Table by filling in each blank with the required number. See the examples.

|  | Mathematical <br> Expression | Base | Index or <br> Power | Product Form | Value |
| :--- | :---: | :---: | :---: | :---: | :---: |
| a) | $3^{2}$ | 3 | 2 | $3 \times 3$ | 9 |
| b) | $6^{4}$ | 6 | 4 | $6 \times 6 \times 6 \times 6$ | 1296 |
| c) | $7^{3}$ |  |  |  |  |
| d) | $10^{5}$ |  |  |  |  |

II.A. You have learnt that expressions with Indices can be read in three ways. Use this knowledge to fill in the blanks with the correct numbers. See the example.

|  | Mathematical <br> Expression | Can be Read As: | Or: | Or: |
| :---: | :---: | :---: | :---: | :---: |
| a) | $9^{5}$ | $\underline{9}$ raised to $\underline{5}$ | $\underline{9}$ to the power $\underline{5}$ | $\underline{5^{\text {th }}}$ power of $\underline{9}$ |
| b) | $4^{7}$ | $\ldots \quad$ raised to | $\ldots \quad$ to the power__ | $\ldots$ |
| c) | $8^{12}$ | $\ldots \quad$ raised to | $\ldots \quad$ to the power of |  |

II.B. To show how well you have learnt the meaning and value of rational numbers in index form, fill in the blanks in the Table with the correct numbers.

|  | Mathematical <br> Expression | Base | Index <br> or <br> Power | Product Form | Can be Read As: |
| :--- | :---: | :---: | :---: | :---: | :---: |
| a) | $\left(\frac{1}{5}\right)^{3}$ | $\frac{1}{5}$ | 3 | $\frac{1}{5} \times \frac{1}{5} \times \frac{1}{5}$ | 3rd power of - |
| b) | $\left(\frac{3}{7}\right)^{5}$ | $\frac{3}{7}$ | - | $\frac{3}{7} \times \frac{3}{7} \times \frac{3}{7} \times \frac{3}{7} \times \frac{3}{7}$ | $-\quad$ power of $\frac{3}{7}$ |
| c) | - | - | $\frac{6}{11} \times \frac{6}{11} \times \frac{6}{11} \times \frac{6}{11}$ | $4^{\text {th }}$ power of $\frac{6}{11}$ |  |
| d) | $\left(\frac{10}{21}\right)^{2}$ | - | - |  |  |

III.A. Look carefully at the examples given below. They will help you discover the rule to be followed when you multiply two expressions with indices, when the base is the same.

| Example I: | Example II: | Example III: |
| :---: | :---: | :---: |
| $8^{2} \times 8^{5}$ | $(-2)^{3} \times(-2)^{2}$ | $\overline{\left(\frac{5}{7}\right)^{4} \times\left(\frac{5}{7}\right)^{2}}$ |
| $=8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8$ | $=(-2) X(-2) X(-2) \times(-2) X(-2)$ | $=\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7}$ |
| $=8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8$ | $=(-2) \times(-2) \times(-2) \times(-2) \times(-2)$ |  |
| $=8^{7}[2+5=7]$ | $=(-2)^{5} \quad[3+2=5]$ | $=\frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7} \times \frac{5}{7}$ |
| So, we can write: | So, we can write: | $=\left(\frac{5}{7}\right)^{6}[4+2=6]$ |
| $8^{2} \times 8^{5}=8^{2+5}$ | $(-2)^{3} \times(-2)^{2}=(-2)^{3+2}$ | So, we can write: |
| The BASE of both the | The BASE of both the expressions is $\mathbf{- 2}$. | $\left(\frac{5}{7}\right) \times\left(\frac{5}{7}\right)^{2}=\left(\frac{5}{7}\right)^{4}$ |
| expressions is 8. |  | The BASE of both the expressions is $\frac{5}{7}$. |

Fill in the blanks in the answer to the question by using the correct words from those given within brackets.
Qn. What have the above examples helped you discover?
Ans. The above examples have helped me to discover that when multiplying numbers having the same base, the base of the product (are added/remains the same) $\qquad$
$\qquad$ and the indices(are added/remains the same) to get the index of the product.

Where the Base (a) is a Rational Number and the Indices ( m and n ) are any positive integers, then:
$a^{m} \times \quad a^{n}=a^{m+n}$
III.B. Write the expression given in Column A, in the Product form in Column B. Then, write the proper numbers in the 'boxes' in Column C. See the example.

|  | 'A' Expression | 'B' Product Form | 'C' Solution |
| :---: | :---: | :---: | :---: |
| a) | $(-4)^{3} \times(-4)^{5}$ | $(-4) \times(-4) \times(-4) \times(-4) \times(-4) \times(-4) \times(-4) \times(-4)$ | $(-4) \square{ }^{+} \square$ |
| c) | $\left(\frac{2}{7}\right)^{5} \times\left(\frac{2}{7}\right)^{2}$ |  | $\left(\frac{2}{7}\right) \square+\square$ |

III.C. Look carefully at the expression given in Column P. Then, fill in the 'boxes' in Columns $Q$ and $R$ with the correct numbers. - See the example.

|  | Column 'P' | Column 'Q' | Column 'R' |
| :--- | :--- | :---: | :---: |
| a) | $(3)^{9} \times(3)^{7}$ | (3) $\square+\square$ | $(3) \square$ |
| c) | $b^{11} \times b^{14}$ | $b \quad \square+\square$ | $b$ |
| d) | $\left(\frac{2}{7}\right)^{2} \times\left(\frac{2}{7}\right)^{5}$ | $\frac{2}{7} \square+\square$ | $\frac{2}{7} \square$ |

