"Thurstan College, being unshaken amidst the COVID 19 challenges"
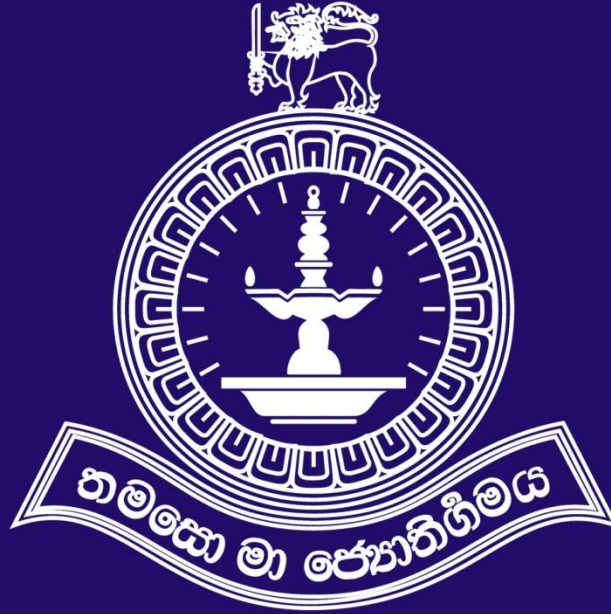
Series of Supportive Activities

Grade 10 - Mathematics

THURSTAN COLLEGE
COLOMBO 07

Thurstan College, being unshaken amidst the COVID 19 challenges

Series of Supportive Activities

Concept, Guidance & Supervision - Principal Mr. Pramuditha Wickramasinghe

Implementation   - Deputy Principal (Education Development)

           Mrs. N.G.H. Samanthini

           -Assistant Principal (Grade6-13)

           Mr. M.C.Jayasekara

           -Grade Head (Grade10) Mr. Dinusha Welagedara

Preparation of Activity Books

- Grade 6 (Mathematics)   -   Mrs. Chathuri Wathsala

- Grade 7 (Mathematics)   -   Mrs. Chathuri Wathsala

- Grade 8 (Mathematics)   -   Mrs. Dilini Lankesha

- Grade 9 (Mathematics)   -   Mrs. Dilini Lankesha

- Grade 10(Mathematics)   -   Mrs. Aruni Wijesundara

- Grade 11 (Mathematics)   -   Mrs. N. G. M. D. Ranmali
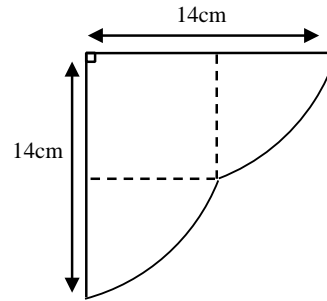
Mathematics
Project

(English Medium   )

Grade 10

First Term

Perimeter and Area

01)   The figure shows a logo, made by the students in a student camp. It is constructed using two
      sectors on the two sides of square with a side 7 cm.

(i)   Find the perimeter.


(ii)   If the logo cut from circular shaped lamina of the radius 14 cm, find the number of
         circular laminas needed to cut 48 logos.

(iii)   After cutting logos, find the area of the wastage of the paper.

02) A sketch of a certain home land is shown in the figure. It consists of a semi – circular shaped pond with the diameter 21m, a road width 2m and a grass land.

(i) Find the area of the home land with road.

35m

22m

2m   21m
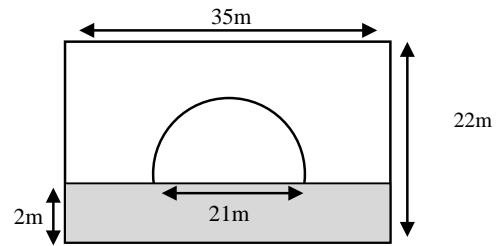
(ii) Find the length of semi–circular boundary of the pond.

(iii) Find the perimeter of the portion that grass are grown.

(iv) Find the area of of the portion that grass are grown.

(v) If Rs. 100 is spent to plant grass per $1m^2$ of portion that grasses are grown. Calculate total expenditure for planting grass.

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03) A gift is prepared by two sectors, centers A, D and a semi – circular part, diameter BC from a rectangular iron plate ABCD as given figure below.

(i) Find out arc length of sector with center A.
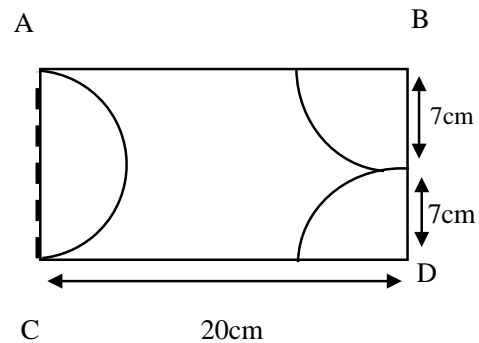
(ii) Calculate the perimeter of this gift.

(iii) Calculate area of removing parts of the plate ABCD when gift is prepared.

(iv) Calculate the area of the gift.

(v) If Rs. 4.50 is spent to paint $1cm^2$ of front side of the gift calculate total expenses spent to paint its front side.

04) The figure shows a playground ABCD. Sand is spread in the section BCE which is a sector of a circle with central angle 45^0. (Take $\pi = \dfrac{22}{7}$)

(i) Find the perimeter of the section ABED.

15 m

A

B

10m

D

E

11m

14m

45^0
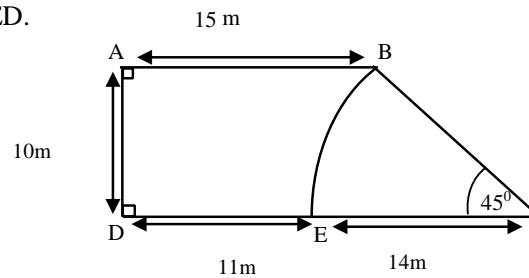
(ii) Find the area of the section in which sand is spread.

(iii) Find the area of the section apart from that in which sand is spread.

(iv) It is required to allocate a section within this playground for a tea shop. Its area should be $\dfrac{1}{6}$ of the area of the section apart from that in which sand is spread and it should take the shape of a right angled triangle with AD as one boundary and another boundary on DC. On the given figure, mark the section that should be allocated for tea shop, together with the measurements.

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Fractions

1) (a) (i) Simplify

$$2\frac{1}{3} \times \left(\frac{1}{2} + \frac{1}{4}\right)$$

(b) $\frac{5}{8}$ of a tank is filled with the water $\frac{3}{5}$ of amount of filled water is used for home purposes.

(i) What is the fraction of capacity of whole tank used for home purposes?

(ii) Write down remaining amount of water as a fraction of capacity of whole tank.

(iii) If the tank is completely filled when 750l is added to the remaining amount of water, find the capacity of the tank.

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2) $\frac{3}{5}$ of the population of the certain city are school students, $\frac{3}{20}$ of the population are employees. The remaining number of people is 4600.

(i) Find what fraction of the whole population is the school students and employees.

(ii) What fraction of the whole population are the remaining people?

(iii) Find the total population in the city.

(iv) Find the number of school students in the city.

3) The ticket was printed for the stage drama to built the mathematics laboratory in the school. $\frac{1}{6}$ of the tickets are Rs. 1000 tickets. $\frac{1}{3}$ of the tickets are Rs. 500 tickets. The remaining tickets are Rs. 250 tickets.

(i) What is the fraction of the Rs. 250 tickets, out of the total tickets.

(ii) The income of the selling of Rs. 250 tickets is Rs. 300 000. How many Rs. 250 tickets were printed?

(iii) Find the number of tickets of Rs. 1000 and Rs. 500 separately. then find the total amount of money gain by selling the tickets.

4) Kasun spent $\frac{2}{5}$ from his money for CTB season tickets and $\frac{1}{3}$ from the remaining to buy a book.

    (i)   After paying for the season ticket, express the remaining portion as a fraction.

    (ii)   Write the amount he spent to buy the book as a fraction from the whole amount of money.

    (iii)   If he has Rs. 70 with him after these expenses, find the total amount money he had.

    (iv)   Find the amount of money he spent for season ticket and book separately.

Square Root

1) The area of a square plot of land is 75 m^2. Find the length of a side correct to one decimal place.

2) The length of a triangular plot of land of area 168 m^2 is 24m. Find the length of its diagonal.

3) Chilly plants are grown in a garden in such a way that the number of rows are equal to the number of plants in a row. If the total number of plants is 6084, find the number of plants in a row.

4)   The area of a land in the shape of an isosceles right angled triangle is 394.81 m^2. Find its perimeter.

Binomial Expressions

1)   Expand the following.

   (i) $(2x + 3)(3x + 5)$

   (ii) $(5x - 2y)(2x + 3y)$

   (iii) $(\frac{1}{3} p + \frac{2}{5} q)^2$

   (iv) $(\frac{1}{4} x \frac{2}{3} - y)^2$

   (v) $(2x - 7)^2$

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2) Find the value of,

    (i) 104^2 (ii) 97^2 (iii) 23^2

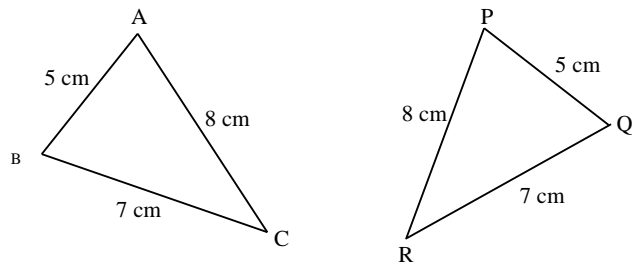3) Verify the following for the values a = 3 and b = 5

$$(a + b)^2 = a^2 + 2ab + b^2$$

4)   (i)   Find the value of $a^2 + b^2$ when a + b = 5 and ab = 6.

(ii)   Find the value of $p^2 + \dfrac{1}{p^2}$ when $p + \dfrac{1}{p} = 3$.

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1)

Show that the triangle ABC and triangle PQR are congruent.
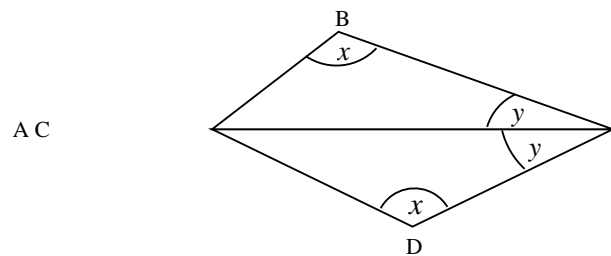
2)   AB and CD are two straight lines bisecting each other at O. If AC = DB, prove that
CÂO = OB̂D.

3)   In the triangle ABC, AB = AC. The bisector of $B\hat{A}C$ meets BC at X. Prove that,

(i) $A\hat{B}C = A\hat{C}B$

(ii) $A\hat{X}B = A\hat{X}C = 90^0$

4)   In the quadrilateral ABCD, A$\hat{B}$C = A$\hat{D}$C and B$\hat{C}$A = A$\hat{C}$D. Prove that BC = DC.

5)   A and B are two points on a circle with center O. M is a point on AB such that OM is perpendicular to AB. Prove that the triangles OMA and OMB are congruent.

If $A\hat{O}M = 40^0$, find the value of $B\hat{O}M$.

6)   The sides AB and DC of the quadrilateral ABCD are equal and parallel. Prove that   BÂD
        = BĈD.

Factors of Quadratic Expressions

1)   Factorize.

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

       (ii) $a^2 - 8a + 12$

       (iii) $x^2 + x - 10$

       (iv) $a^2 - 9a - 90$

       (v) $2x^2 + 7x + 6$

(vi) $2x^2 - 5x - 3$

(vii) $6x^2 + 13xy - 5y^2$

(viii) $4y^2 + y - 14$

2) Factorize.

(i) $a^2 - 100$

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

(iii) $4x^2y^2 - 25a^2$

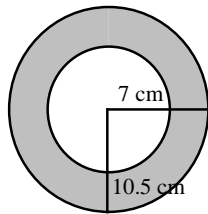(iv) $(x + 3)^2 - 25$

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

(vi) $(p + 1)^2 - (p - 1)^2$

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

(viii) $121 - (3 - x)^2$

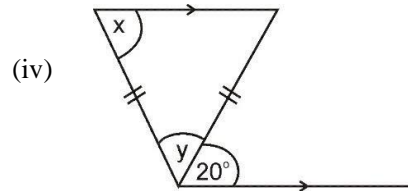3. Using the knowledge of factors, Find the area of the shaded part.
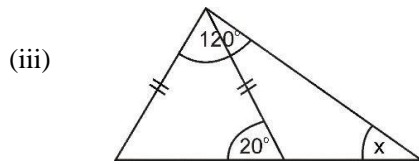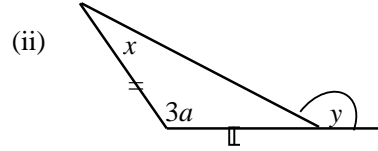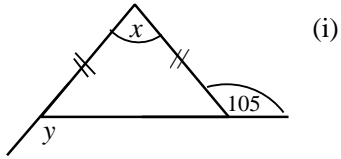

4. Find the value of the following numerical expressions using the knowledge on the factors of trinomial quadratic expressions.

(i) $25^2 + 8 \times 25 + 12$

(ii) $95^2 - 17 \times 95 + 30$

Triangles

1. Find the values of *x* and *y* in each figures.

(i)

(ii)

(iii)

(iv)

2. In the triangle ABC, $B\hat{A}C = 55^0$ and $A\hat{B}C = 70^0$. Prove that AB = BC.
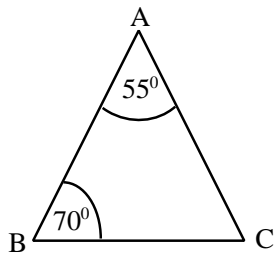
3.   In the triangle ABC, AB = AC, X and Y are points on BC such that BX = CY Prove that

i$\triangle$ ABX = $\triangle$ ACY

ii. A$\hat{X}$Y = A$\hat{Y}$X
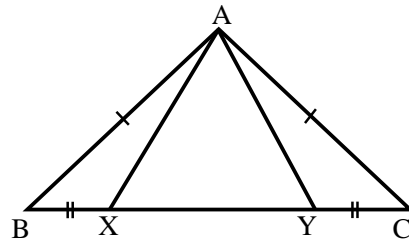
4.   In the triangle PQR, PQ = PR RP is produced to S. If $P\hat{R}Q = 40^0$ and $S\hat{Q}P = 50^0$, show that
PSQ is an isosceles triangle.

5.   In the two isosceles triangles ABC and DBC, AB = AC and DB = DC. points A and D are on
       the opposite sides of BC, AD and BC meet at O. Prove that,

       i.△ABO △ ACO

       ii.O is the mid point of BC.

       iii. AO ⊥ BC

6.   In the triangle ABC, the bisectors of the angles $A\hat{B}C$ and $A\hat{C}B$ meet at O. If OB = OC, prove that the triangle ABC is an isosceles triangle.

Inverse Proportions

1. In a hospital, there is sufficient drugs treat 18 patients for high blood pressure for 15 days. If two new patients were admitted, for how many days will the drug last?

2. 12 men by working 8 hours a day can finish a certain piece of work in 10 days. After 4 days 4 men leave the job. How many more days will be taken to finish the task if the rest work 9 hours a day?

3. Five excavator machines can remove mud from a river in 20 days. If 10 machines are employed for this purpose, how many days earlier will the work be finished?

4.   It was decided to go to a holiday home to spend a vacation. Food necessary for nine persons for four days was taken with them. But, three persons did not take part in the trip. For how many days will the food taken be sufficient?

5.   A hostel process food material sufficient to feed 10 students for 18 days. If two more students joined the hostel. For how many days will the existing food materials be sufficient? After six days three students went home after getting ill. For how many days will the remaining food be sufficient?

Data Representation

1. The information collected about the lunch preferred by 120 people who were participated for a certain gathering is given in the following incomplete table and the pie chart.
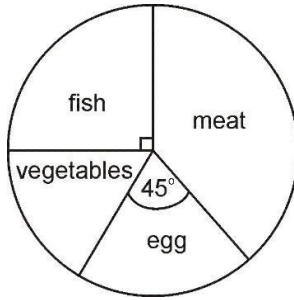
| Type of food	No: of people
Meat	50
Fish	
Egg	
Vegetable	

(i) Fill in blanks in the table.

(ii) What is the angle of the center of the sector which represents the people who ate meet?

(iii) If all the people who preferred egg ate vegetables and all the people who preferred fish ate meat, find the ratio between the number of people who ate vegetables and the number of who ate meat.

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2. The incomplete pie chart represents the information on the number of patients who came to a certain dispensary during 5 days of a week.
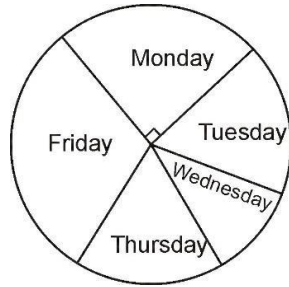

(i) If the total number of patients who come during 5 days of the week was 60, how many patients came on Monday?

(ii) If the number of patients who came on Tuesday was 10, find the angle at the center of the relevant sector.

(iii) Number of patients who came on Wednesday and Thursday are same and the number of patients who came on Friday was three times of the number of patients who came on one of the above days. Accordingly, find the angle at the center of the sector relevant to Friday and mark it on the relevant sector.

3. The sectors A, B, C, D of the given pie chart represent the number of students who received marks in the intervals 0 – 10, 10 – 20, 20 – 40 and 40 – 50 respectively, for a test that the group of students faced. The maximum mark that a student could receive is 50.
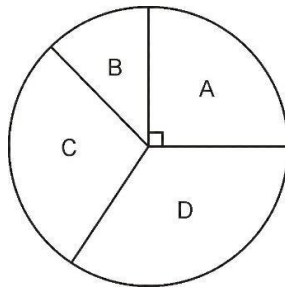
(i) To which interval does the marks of the least number of students belong?

(ii) If the number of students represented by A is 12, how many students are there in total?

(iii) The number of students represented by D is 18. What is the magnitude of the angle of this sector.

(iv) The magnitude of the angle of the sector B is 45^0. How many students represented by the sector B and sector C.

4.   The pie chart given in the figure shows how a certain group of farmers selected various types of vegetables for growing. Each farmer grow only one type of vegetable.   The number of farmers who selected pumpkins is equal to the number of farmers who selected brinjals.
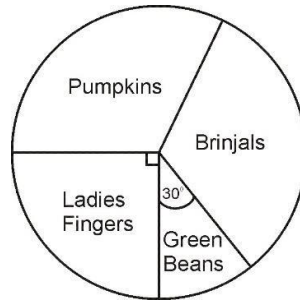
(i)   Find the magnitude of the angle at the center of the sector that represents the farmers who selected brinjals.

(ii)   The number of farmers who selected green beans is 15.
       Find the number of farmers who selected pumpkins.

(iii)   Find the total number of farmers represented in this pie chart.

(iv)   After one year, 20 farmers who had been growing brinjals stopped growing vegetables. Find the magnitude of the angle at the center of the sector which represents the farmers growing brinjals, in a new pie chart drawn considering the changed data.

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Least Common Multiple of Algebraic Expressions

1. Find the L. C. M of the following algebraic terms

    (i) $3x^2y^2, 5x, 2x^2y$

    (ii) $4x^4y, 6xy^2, 21y$

    (iii) $8a^2b^2 , 24a^2b, 18ab^2$

2. Find the L. C. M of the following expressions.

    (i) $(x+1)^2, 3(x+1), (x^2-1)$

(ii) $2x^2 - 2x - 4,\ x^2 + 3x + 2,\ 3x^2 - 13x + 12$

(iii) $4a\ (a + b),\ 5b\ (a + b),\ 10(a + b)^2$

(iv) $4xy,\ 10x\ (5x + 2),\ 8y\ (5x - 2)$

(v) $x^2 - 4x - 21,\ x^2 - 5xy + 6y^2, x^2 - 2\ xy - 3y^2$

(vi) $2a^2 - 18a - 44,\ 3a^2 - 24a - 99,\ a^2 + 5a + 6$