SOLUTION

THE ASSOCIATION OF MATHEMATICS TEACHERS OF INDIA

57th NMTC - SCREENING TEST - GAUSS CONTEST

PRIMARY LEVEL - V & VI GRADES

1. The value of $\frac{9999+7777+5555}{8888+6666+4444}$ is

(A) 1 (B) $\frac{755}{448}$ (C) $\frac{7}{6}$ (D) $\frac{1}{6}$

Ans. (C)

Sol. $\frac{1111[9+7+5]}{1111[8+6+4]}=\frac{21}{18}=\frac{7}{6}$

2. The sum of three prime number is 30. How many such sets of prime numbers are there?

(A) 1 (B) 2 (C) 3 (D) 0

Ans. (B)

Sol. $P_1 + P_2 + P_3 = 30$

odd + odd + even = even

2 is only even prime number.

$\therefore$ $P_1 + P_2 + 2 = 30$

$P_1 + P_2 = 28$

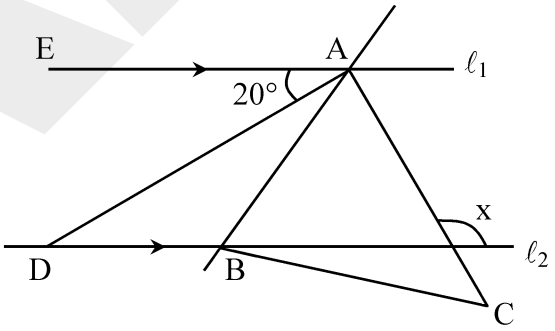
$P_1 = 5$ $P_2 = 23$

$P_1 = 11$ $P_2 = 17$

$\therefore$ Two sets possible

1. 5, 23, 2
2. 11, 17, 2

3. In the adjoining figure, lines ℓ_1, ℓ_2 are parallel lines. ABC is an equilateral triangle. AD bisects $\angle EAB$. Then x = ?



(A) 100° (B) 95° (C) 105° (D) 110°

Ans. (A)

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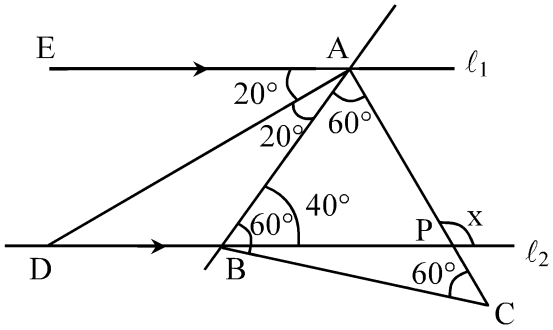
PRIMARY LEVEL - V & VI GRADES

Sol.

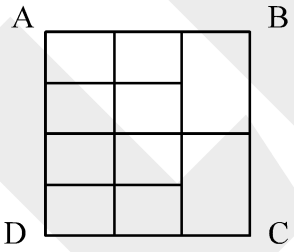


$\angle ABP = \angle EAB = 40°$ [Alternate Interior Angles]

$\angle x = \angle BAP + \angle ABP = 40° + 60° = 100°$

[Exterior angle of ΔABP.]

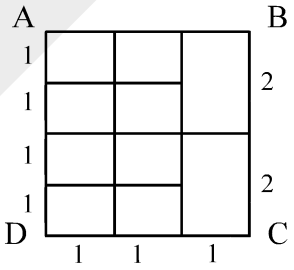
4. In the figure, ABCD is a square. It consists of squares and rectangles of areas 1 cm^2 and 2 cm^2 as shown. The perimeter of the square ABCD (in cm) is



(A) 17 (B) 15 (C) 16 (D) 14

Ans. (D*)

Sol. If we do not consider ABCD a square but a rectangle



Then AB = 3, AD = 4

Then perimeter of ABCD = 2[3 + 4] = 14 cm

D option if ABCD is not square.

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PRIMARY LEVEL - V & VI GRADES

5. If $a*b=\frac{a+b}{a-b}$, then the value of $\frac{13*6}{5*2}$ is

(A) $\frac{21}{4}$ (B) $\frac{17}{3}$ (C) $\frac{19}{39}$ (D) $\frac{57}{49}$

Ans. (D)

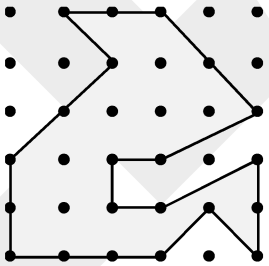
Sol. If $a*b=\frac{a+b}{a-b}$, then the value $\frac{13*6}{5*2}$

$a*b=\frac{a+b}{a-b}$ $\qquad 5*2=\frac{5+2}{5-2}=\frac{7}{3}$

$13*6=\frac{13+6}{13-6}=\frac{19}{7}$

$\frac{13*6}{5*2}=\frac{19/7}{7/3}=\frac{19\times3}{7\times7}=\frac{57}{49}$

6. In the adjoining figure, the distance between any two adjacent dots is 1 cm. The area of the shaded region (in cm^2) is



(A) $\frac{31}{3}$ (B) $\frac{31}{2}$ (C) $\frac{33}{2}$ (D) $\frac{35}{2}$

Ans. (B)

Sol. Area $= 5\times5-\left[\frac{1}{2}\times1\times5+\frac{1}{2}\times2\times1+\frac{1}{2}\times2\times2+\frac{1}{2}\times2\times1+2\times1+1\times1\right]$

$=25-\left[\frac{5}{2}+1+2+1+2+1\right]$

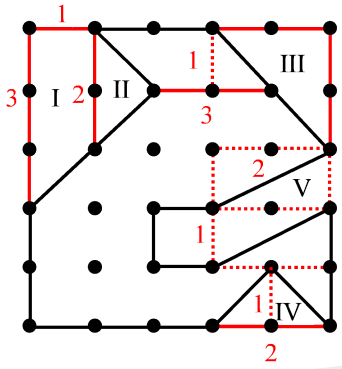
$=25-7-\frac{5}{2}=18-\frac{5}{2}=\frac{31}{2}$

SOLUTION

THE ASSOCIATION OF MATHEMATICS TEACHERS OF INDIA

57th NMTC - SCREENING TEST - GAUSS CONTEST

PRIMARY LEVEL - V & VI GRADES



7. Three natural numbers n_1 , n_2 , n_3 are taken.

Let $n_1 < n_2 < n_3$ and $n_1 + n_2 + n_3 = 6$. The value of n_3 is

(A) 1 (B) 2 (C) 3 (D) 1 or 2 or 3

Ans. (C)

Sol. n_1, n_2, n_3 are natural numbers.

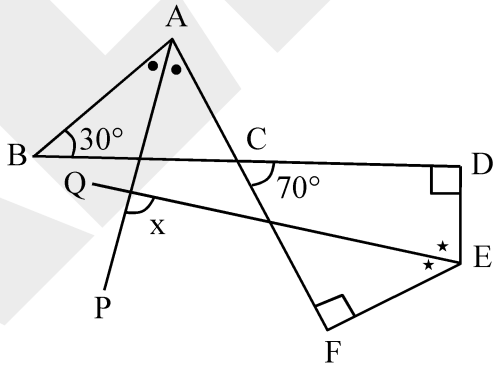
$n_1 < n_2 < n_3$

$n_1 + n_2 + n_3 = 6$

$1 + 2 + 3 = 6$

$n_3 = 3$

8. In the adjoining figure, AP and EQ are respectively the bisectors of ∠BAC and ∠DEF. Then, the measure of angle x is



(A) 90° (B) 85° (C) 105° (D) 75°

Ans. (D)

Sol. In Quadrilateral CDEF

$\angle C + \angle D + \angle E + \angle F = 360°$

$70° + 90° + 2y + 90° = 360°$

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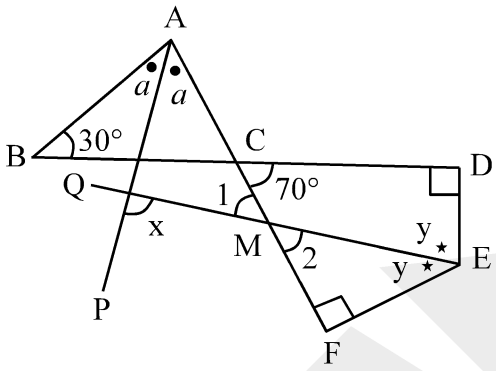
$2y = 110$

$y = 55°$



$\angle 2 = 180° - [55° + 90°]$ [Angle sum property of ΔMEF]

$= 35°$

$\angle 1 = \angle 2 = 35°$ [Vertically opposite angle]

Now

$\angle ACB = 70°$ [Vertically opposite angle]

In ΔABC

$\angle A + \angle B + \angle C = 180°$

$2\angle a + 30° + 70° = 180°$

$2\angle a° = 80°$

$\angle a° = 40°$

$\angle x = \angle a + \angle 1$ [Exterior angle]

$= 40° + 35° = 75°$

9. The number of two-digit positive integers which have at least one 7 as a digit is

(A) 17 (B) 19 (C) 9 (D) 18

Ans. (D)

Sol. Two digits positive integers which have 7, at least one digit are

17, 27, 37, 47, 57, 67, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 87, 97

$\therefore$ Total 18 numbers

SOLUTION

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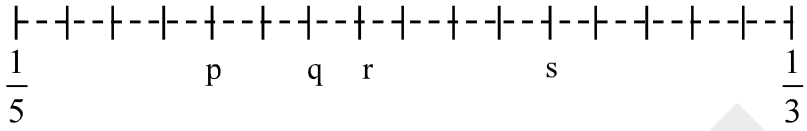
PRIMARY LEVEL - V & VI GRADES

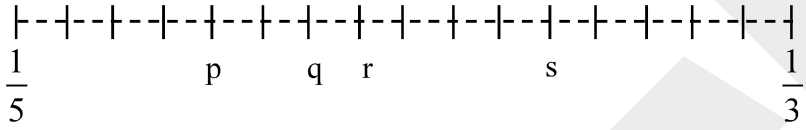
10. The fractions $\frac{1}{5}$ and $\frac{1}{3}$ are shown on the number line. In which position should $\frac{1}{4}$ be shown?



(A) p (B) q (C) r (D) s

Ans. (B)

Sol.



$\frac{1}{5}=\frac{12}{60}$ $\frac{1}{4}=\frac{15}{60}$ $\frac{1}{3}=\frac{20}{60}$

$\frac{1}{5}=\frac{12\times16}{60\times16}=\frac{192}{60\times16}$

$\frac{1}{4}=\frac{15\times16}{60\times16}=\frac{240}{60\times16}$

$\frac{1}{3}=\frac{20\times16}{60\times16}=\frac{320}{60\times16}$

11. Samrud reads $\frac{1}{3}$ of a story book on the first day, $\frac{1}{2}$ of the remaining book on the second day and $\frac{1}{4}$ of the remaining book as on the end of the first day, on the third day and left with 23 pages unread. The number of pages of the book is

(A) 138 (B) 148 (C) 128 (D) 136

Ans. (A)

Sol. Let the total pages be x

According to question

$$x-\left[\frac{1}{3}x+\frac{1}{2}\left(\frac{2}{3}x\right)+\frac{1}{4}\left(\frac{2}{3}x\right)\right]=23$$

$$x-\left[\frac{1}{3}x+\frac{1}{3}x+\frac{1}{6}x\right]=23$$

SOLUTION

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$$x-\left[\frac{2x+2x+x}{6}\right]=23$$

$$x-\frac{5x}{6}=23$$

$$\frac{1}{6}x=23$$

$$x=138$$

12. The product of four different natural numbers is 100. What is the sum of the four numbers?

(A) 20 (B) 10 (C) 12 (D) 18

Ans. (D)

Sol. $x_1 \times x_2 \times x_3 \times x_4 = 100$

$x_1 ; x_2 ; x_3 ; x_4$ are natural numbers and are different

$x_1 \times x_2 \times x_3 \times x_4 = 1 \times 2 \times 5 \times 10$

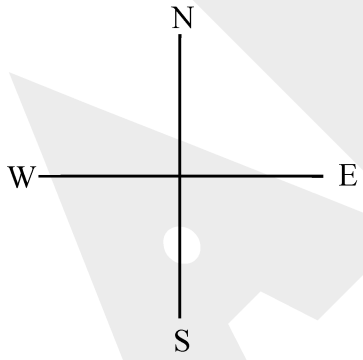
$\therefore$ Sum = 1 + 2 + 5 + 10 = 18

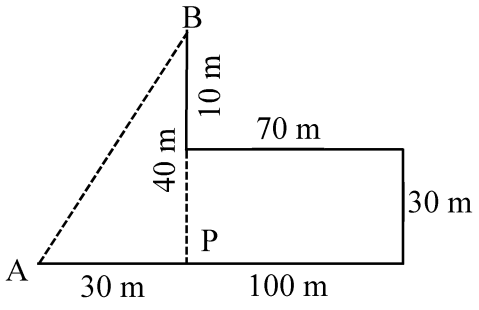
13. Peter starts from a point A in a playground and walks 100 m towards East. Then he walks 30 m towards North and then 70 m towards West and then finally 10 m North to reach the point B. The distance between A and B (in metres) is

(A) 50 (B) 42 (C) 40 (D) 30

Ans. (A)

Sol.





$AB^2 = AP^2 + BP^2$

$= 30^2 + 40^2$

$= 900 + 1600$

$AB^2 = 2500$

AB = 50 m

SOLUTION

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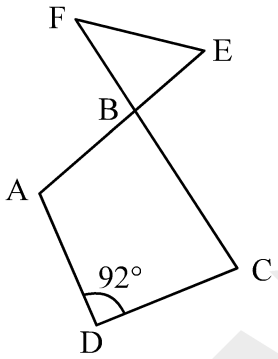
PRIMARY LEVEL - V & VI GRADES

14. In the adjoining figure ∠DAB is 8° more than ∠ADC; ∠BCD is 8° less than ∠ADC. ∠FEB is half of ∠FBE. Then the measure of ∠BFE is



(A) 54° (B) 52° (C) 49° (D) 50°

Ans. (A)

Sol. ∠DAB = ∠DAB + 8° = 92° + 8°

∠DAB = 100°

∠BCD = ∠ADC – 8° = 92° – 8°

∠DAB = 84°

$\angle FEB = \frac{1}{2}\angle FBE$

∠ABC = 360° – [100° + 84° + 92°] = 84°

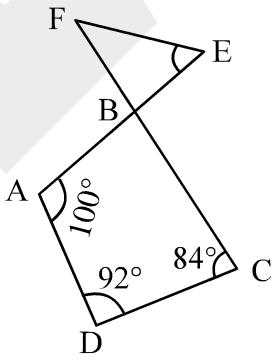
∠FBE = 84°

$\therefore \quad \angle FEB = \frac{1}{2}\times 84° = 42°$

∠BFE = 180° – [84° + 42°]

= 180° – [126°]

∠BFE = 54°



15. The fraction to be added to the fraction $\cfrac{1}{2+\cfrac{1}{3+\cfrac{1}{1+\frac{1}{4}}}}$ to get 1 is

(A) $\frac{26}{43}$ (B) $\frac{18}{43}$ (C) $\frac{24}{43}$ (D) $\frac{23}{43}$

Ans. (C)

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PRIMARY LEVEL - V & VI GRADES

Sol. $\dfrac{1}{2+\dfrac{1}{3+\dfrac{1}{1+\dfrac{1}{4}}}} = \dfrac{1}{2+\dfrac{1}{3+\dfrac{1}{\dfrac{5}{4}}}}$

$= \dfrac{1}{2+\dfrac{1}{3+\dfrac{4}{5}}} = \dfrac{1}{2+\dfrac{1}{\dfrac{19}{5}}}$

$= \dfrac{1}{2+\dfrac{5}{19}} = \dfrac{1}{\dfrac{38+5}{19}} = \dfrac{19}{43}$

Now, According to question

$x+\dfrac{19}{43}=1$

$x=1-\dfrac{19}{43}=\dfrac{43-19}{43}=\dfrac{24}{43}$

Section B (Fill in the Blanks)

16. Some amount of money is divided among A, B and C, so that for every ₹100 A has, B has ₹ 65 and c has ₹ 40. If the share of C is ₹ 4000, the total amount of money (in ₹) is _____

Ans. **₹ 20500**

Sol. Amount Ratio

A : B : C = 100 : 65 : 40 = 20 : 13 : 8

Total amount = 20 + 13 + 8 = 41 unit

If C has she has 8 unit of the total share

$\therefore$ 8 unit = 4000

$\Rightarrow$ 1 unit = 500

then total amount = 41 unit = 41 × 500 = ₹ 20500

17. ABCDE is a pentagon. The angles A, B, C, D, E are in the ratio 8:9:12:15:10. The external bisector of B and the internal bisector of C meet at P. Then the measure of $\angle BPC$ is _____ degrees.

Ans. **15**

SOLUTION

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PRIMARY LEVEL - V & VI GRADES

Sol. Ratio of Pentagon angle's ABCDE

= 8 : 9 : 12 : 15 : 10

Sum = 8 + 9 + 12 + 15 + 10 = 54

∵ Pentagon's interior angles sum = 540°

So, angle A, B, C, D & E are respectively

80°, 90°, 120°, 150° & 100°

Now, ATQ

External bisector of B and the internal bisector of C meet a P, as in the diagram given.

∵ ∠C = 120°

So, from angle bisector of C, ∠XCB = 60°

Now, ∠BCP = 180° – 60° = 120°

∴ ∠B = 90°

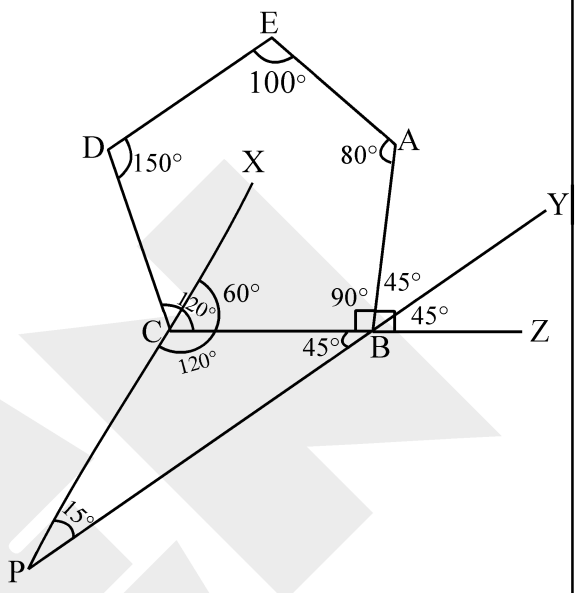
So, from external bisector of B, ∠YBZ = 45°

∠YBZ = 45° = ∠CBP {Vertical opposite angle}

For ∠BPC = 180 – ∠BCP – ∠CBP {Angle sum property}

= 180 – 120 – 45

∠BPC = 15°



18. The least number, when lessened (decreased) by 5, to be divisible by 36, 48, 21, and 28 is _____.

Ans. 1013

Sol. LCM of 36, 48, 21 & 28 = 1008

Now, ATQ, 1008 + 5 = 1013

19. When $10\frac{5}{6}$ is divided by 91, we get a fraction $\frac{a}{b}$, where a, b are natural numbers with no common factors other than 1; then (b – a) is equal to ____.

Ans. 37

Sol. ATQ, $10\frac{5}{6} \div 91 = \frac{a}{b}$

$\Rightarrow \quad \frac{65}{6} \div 91 = \frac{a}{b}$

SOLUTION

THE ASSOCIATION OF MATHEMATICS TEACHERS OF INDIA

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PRIMARY LEVEL - V & VI GRADES

$\Rightarrow \frac{65}{6} \times \frac{1}{91} = \frac{a}{b}$

$\Rightarrow \frac{5}{6} \times \frac{1}{7} = \frac{a}{b}$

$\Rightarrow \frac{5}{42} = \frac{a}{b}$

Now, (b – a) = 42 – 5 = 37

20. Let p be the smallest prime number such that the numbers (p + 6), (p + 8), (p + 12) and (p + 14) are also prime. Then the remainder when p^2 is divided by 4 is _____.

Ans. 1

Sol. Given P is the smallest prime number

Such that (P + 6), (P + 8), (P + 12) & (P + 14) are also prime.

It is possible, when P = 5

Then numbers are 11, 13, 17, 19 which are prime numbers.

Now, $P^2 = 5^2 = 25$

$25 \div 4$, Remainder = 1

21. A bag contains certain number of black and white balls, of which 60% are black. When 9 white balls are added to the bag, the ratio of the black balls to the white balls is 4:3. The number of white balls in the bag at the beginning is _____.

Ans. 72

Sol. Let the total no. of balls = 10x

black balls = $10x \times \frac{60}{100} = 6x$

white balls = 4x

ATQ, $\frac{6x}{4x+9} = \frac{4}{3}$

$\Rightarrow$ 18x = 16x + 36

2x = 36 $\therefore$ x = 18

No. of white balls in beginning = 4x = 4 × 18 = 72

SOLUTION

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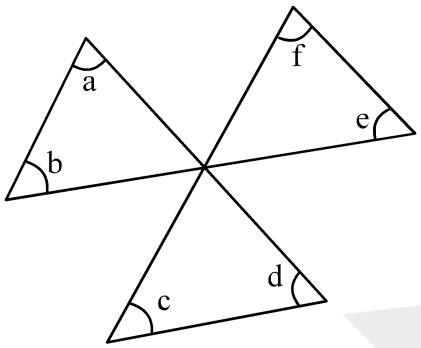
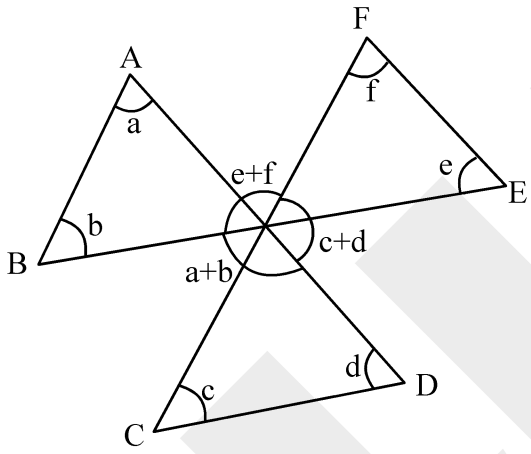
PRIMARY LEVEL - V & VI GRADES

22. In the adjoining figure, the sum of the measures of the angles a, b, c, d, e, f is _____.



Ans. 360

Sol.



[Exterior angle of triangle is equal to sum of two opposite interior angles]

$\therefore$ a + b + c + d + e + f = 360° (complete angle)

23. A basket contains apples, bananas, and oranges. The total number of apples and bananas is 88. The total number of apples and oranges is 80. The total number of bananas and oranges is 64. Then the number of apples is _____.

Ans. 52

Sol. According to questions

Apples + Bananas = 88 … (i)

Apples + Oranges = 80 … (ii)

Bananas + Oranges = 64 … (iii)

Now, by adding all three equation

2 Apple + 2 Banana + 2 Orange = 88 + 80 + 64

$\Rightarrow$ 2 (Apple + Banana + Orange) = 232

SOLUTION

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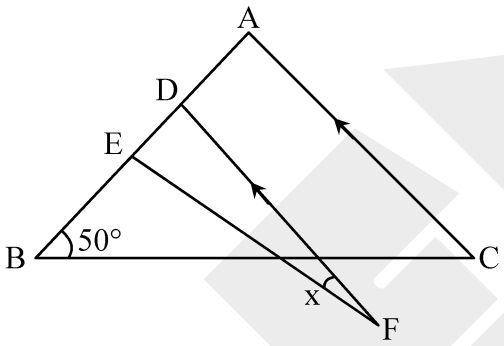
$\Rightarrow$ Apple + Banana + Orange = 116 … (iv)

Now, equation (iv) – equation (iii)

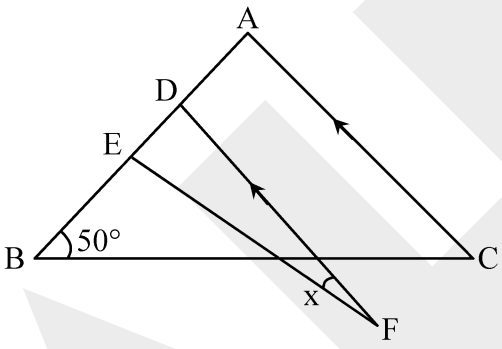
Apples = 116 – 64 = 52

24. ABC is an isosceles triangle in which AB = AC, EDF is an isosceles triangle in which EF = DE. FD is parallel to AC. The degree measure of marked angle x is ____.



Ans. 80°

Sol.



Given that $\angle B = 50°$

Now, $\angle B = 50° = \angle C$ $\{\because AB = AC\}$

$\therefore$ $\angle A = 180° - \angle B - \angle C$ {By angle sum property}

$\angle A = 180° - 50° - 50°$

$\angle A = 80°$

In ΔDEF, $\angle D = 80°$ $\{\because FD$ is parallel to $AC\}$

Now, $\angle DFE = \angle x = 80°$ {By EF = DE}

SOLUTION

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PRIMARY LEVEL - V & VI GRADES

25. The length and breadth of a rectangle are both prime numbers, and its perimeter is 40 cm. Then the maximum possible area of the rectangle (in cm^2) is ____.

Ans. 91

Sol. Let, length & breadth of triangle are a & b

Now, perimeter $2(a + b) = 40$ cm {given}

$\Rightarrow a + b = 20$

$\because$ a & b both are prime numbers.

So, there are two possiblity (13, 7) & (17, 3).

Maximum possible area = 91 cm^2