Mensuration(Preli.)

Instructor:
Md. Abu Yousuf
Assistant Director, Bangladesh Bank

Related Formulas

Shape	Area	Perimeter/Circumference
Square	$A = a^2$	$P = 4a$
Rectangle	$A = l \times b$	$P = 2(l+b)$
Triangle	$A = 1/2(b \times h)$	$P = a+b+c$
Circle	$A = \pi r^2$	$C = 2\pi r$
Parallelogram	$A = b \times h$	$P = 2(a+b)$
Trapezium	$A = 1/2 \times (a+b) \times h$	$P = a+b+c+d$
Rhombus	$A = 1/2 \times d1 \times d2$	$P = 4a$

1. The area of a regular hexagon of side $2\sqrt{3}$ cm is:

A. $18\sqrt{3}$ cm^2
B. $12\sqrt{3}$ cm^2
C. $36\sqrt{3}$ cm^2
D. $27\sqrt{3}$ cm^2

a

$\frac{\sqrt{3}}{4} a^2$

$\Rightarrow \frac{\sqrt{3}}{4} (2\sqrt{3})^2$

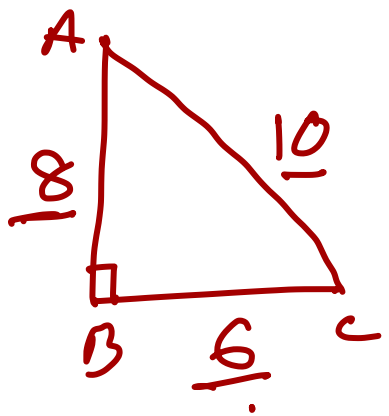
$= \frac{\sqrt{3}}{4} \times 4 \times 3$

$= 3\sqrt{3} \times 6 = 18\sqrt{3}$

2. A string of length 24 cm is bent first into a square and then into a right-angled triangle by keeping one side of the square fixed as its base. Then the area of triangle equals to:

A. 24 cm^2
B. 60 cm^2
C. 40 cm^2
D. 28 cm^2

$\frac{24}{4} = 6cm$



10

8

$24 - 6 = 18$

36

$\frac{64}{100} = 100$

$AB + AC = 18$

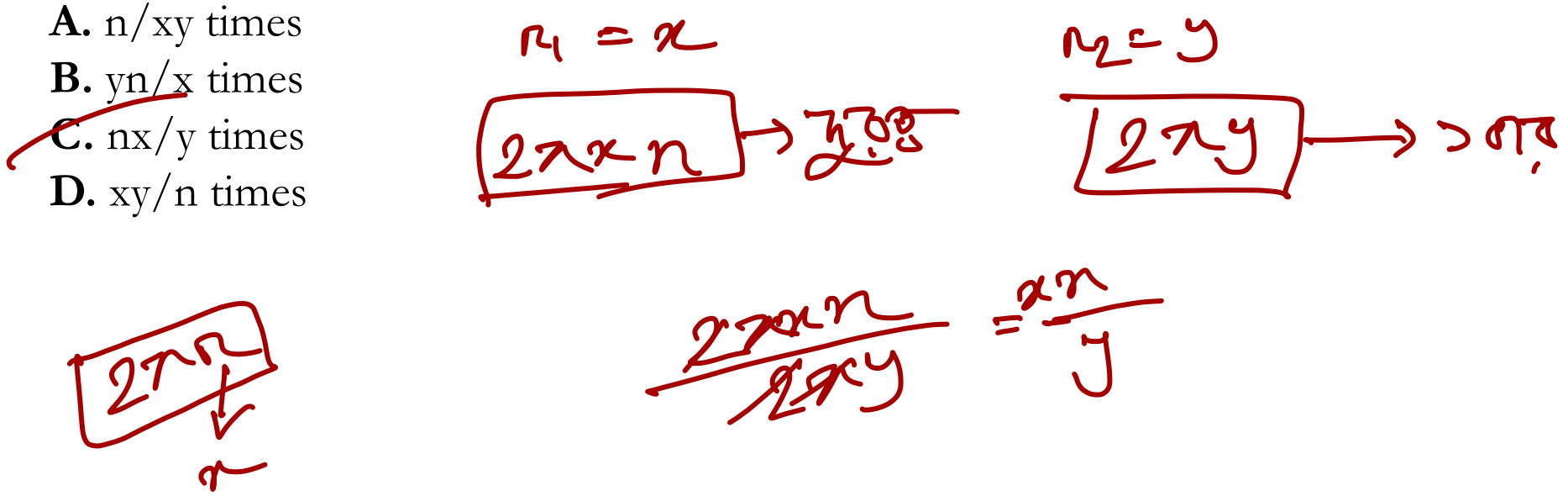
$Area = \frac{1}{2} \times 6 \times 8$

$= 24$

$AC^2 = AB^2 + BC^2$

3. The diameter of the front wheel of an engine is 2x cm and that of rear wheel is 2y cm to cover the same distance, find the number of times the rear wheel will revolve when the front wheel revolves 'n' times,

A. n/xy times
B. yn/x times
C. nx/y times
D. xy/n times



4. If the length of each side of an equilateral triangle is increased by 2 units, the area is found to be increased by $3 + \sqrt{3}$ square unit. The length of each side of the triangle is

A. $\sqrt{3}$ units
B. 3 units
C. $3\sqrt{3}$ units
D. $3\sqrt{2}$ units

$$a$$

$$\frac{\sqrt{3}}{4}(a+2)^2 - \frac{\sqrt{3}}{4}a^2 = 3+\sqrt{3}$$

$$\Rightarrow \frac{\sqrt{3}}{4}(a^2+2a+4-a^2) = 3+\sqrt{3}$$

$$\Rightarrow \frac{\sqrt{3}}{4} \times 4(a+1) = 3+\sqrt{3}$$

$$\Rightarrow a+1 = \sqrt{3}+1$$

$$\Rightarrow a = \sqrt{3}+1-1$$

$$= \sqrt{3}$$

5. The perimeter of a rectangle and an equilateral triangle are same. Also one of the sides of the rectangle is equal to the side of the triangle. The ratio of the area of the rectangle and the triangle is

A. $\sqrt{3} : 1$
B. $1 : \sqrt{3}$
C. $2 : \sqrt{3}$
D. $4 : \sqrt{3}$

$2(l+b) = 3a$ $\quad b = a$

$\Rightarrow 2l + 2b = 3b$

$\Rightarrow l = b/2$

$l \times b : \sqrt{3}/4\, a^2$

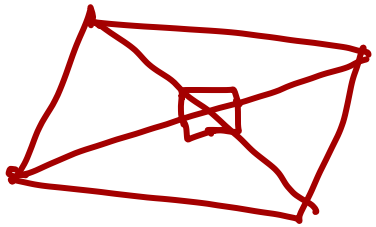
$\Rightarrow b/2 \times b : \sqrt{3}/4\, b^2$

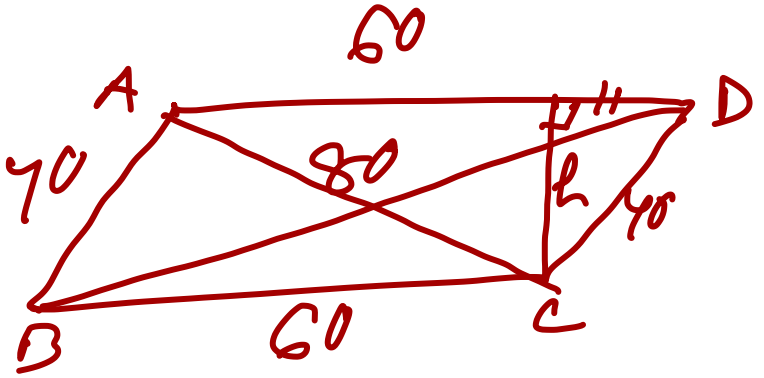
$\Rightarrow \frac{b^2}{2} : \sqrt{3}/4\, b^2$

$\Rightarrow 2 : \sqrt{3}$

6. A parallelogram has sides 60 m and 40 m and one of its diagonals is 80 m long. Its area is

A. $500\sqrt{15}$ m2
B. $600\sqrt{15}$ m2
C. $400\sqrt{15}$ m2
D. $450\sqrt{15}$ m2





$\triangle BCD + \triangle ABD$

$\triangle BCD = \triangle ABD$

$s = \frac{60+40+80}{2} = 90$

Area of $ABCD = 2 \times \triangle BCD$

$= 2 \times 300\sqrt{15}$

$= 600\sqrt{15}$

$\sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{90 \times 30 \times 50 \times 10}$

$= \sqrt{9 \times 15 \times 10000}$

$= 3 \times 100\sqrt{15} = 300\sqrt{15}$

7. A hall 25 metres long and 15 metres broad is surrounded by a varandah of uniform width of 3 metres. The cost of flooring the varandah, at Tk. 25 per square metre is:

A. Tk. 7900
B. Tk. 6900
C. Tk. 7000
D. Tk. 6950

(25×15) (31×21)

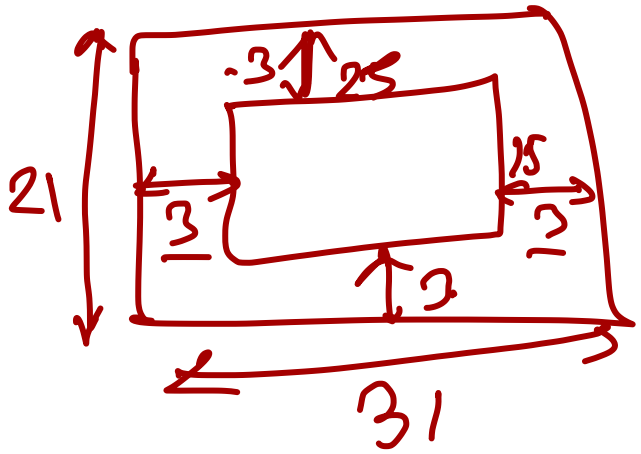
= 375 = 651

(651 − 375) = 276

12 + 3
30 + 75
= 325

⇒ 276 × 25

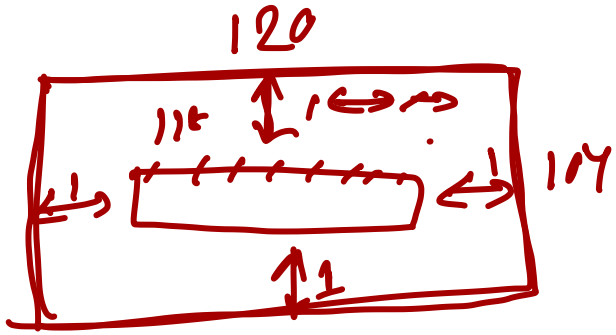
= 6900



276
× 25

8. A rectangular park is 120 m long and 104 m wide. A 1-m wide path runs along the boundary of the park, remaining completely inside the park area. Thus, the outside edges of the path run along the boundary wall of the park. The inside edges of the path are marked with a white line of negligible thickness. If it costs Tk. 2.50 to mark each metre with the white line, then how much would it cost to fully mark the inside edges of the path?

A. 1100
B. 1120
C. 1080
D. 1090



$2(118+102)$

$= 440 \times \frac{25}{10}$

$= 1100$

$25 \times 4 = 100$

44×25

4 | 44 | 11
44
0

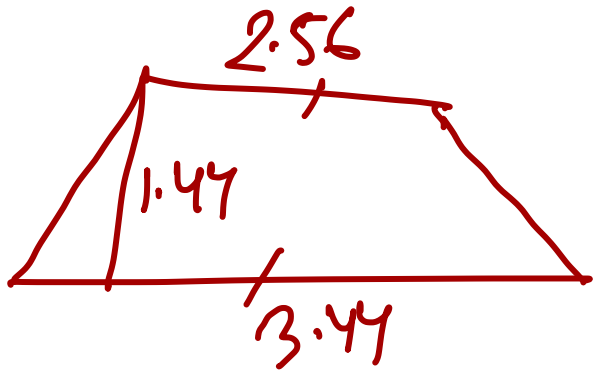
9. A farmer's land is in the shape of a trapezium which has its parallel sides measuring 2.56 yards and 3.44 yards and the distance between the parallel sides is 1.44 yards. The cost of ploughing the land is Tk. 1800 per square yard. What amount will have to be spent in order to plough the entire land?

A. 3672
B. 6732
C. 7776
D. 8214

$= \frac{1}{2} \times (2.56 + 3.44) \times 1.44$

$= 3 \times 1.44$

$= 4.32 \times 1800$

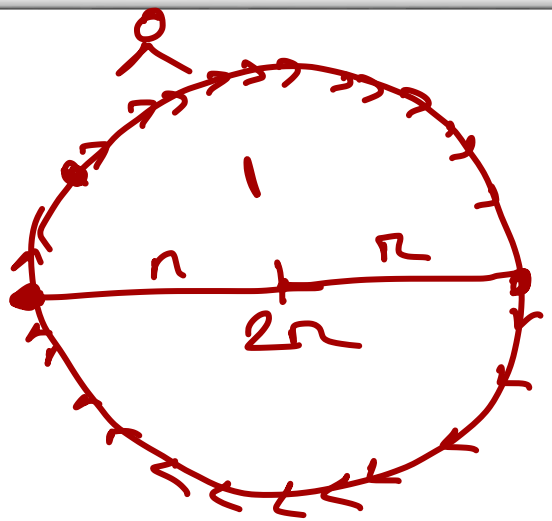


$$\begin{array}{r} 432 \\ \times 18 \\ \hline 7785 \end{array}$$

10. A person observed that he required 30 seconds less time to cross a circular ground along its diameter than to cover it once along the boundary. If his speed was 30 m/minutes. then the radius of the circular ground is

A. 5.5 cm
B. 7.5 cm
C. 10.5 cm
D. 3.5 cm

$$\frac{\cancel{30}^{15}}{\cancel{60}_{2}} \times \frac{30}{} = 15m$$



$$2\pi r - 2r = 15$$

$$\Rightarrow 2r(\pi - 1) = 15$$

$$\Rightarrow 2r\left(\frac{22}{7} - 1\right) = 15$$

$$\Rightarrow 2r \times \frac{15}{22} = 15$$

$$\Rightarrow 2r = \frac{15 \times 7}{15}$$

$$r = 3.5$$

11. From a point within an equilateral triangle, perpendiculars drawn to the three sides are 6 cm, 7 cm and 8 cm respectively, the length of the side of the triangle is:

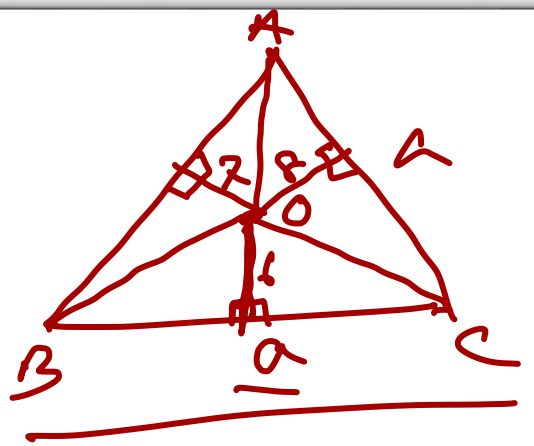
A. 7 cm
B. 10.5 cm
C. $14\sqrt{3}$ cm
D. $14\sqrt{3}/3$ cm

$\triangle OBC + \triangle OAB + \triangle OAC$

$= \frac{1}{2} \times a \times 6 + \frac{1}{2} \times a \times 7 + \frac{1}{2} \times a \times 8$

$= \frac{1}{2} \times a (6+7+8)$

$= \frac{21}{2} a$



$\frac{\sqrt{3}}{4} a^2 = \frac{21}{2} a$

$\Rightarrow a = \frac{21 \times 2}{\sqrt{3}}$

$\Rightarrow a = \frac{42}{\sqrt{3}}$

$\Rightarrow a = \frac{3 \times 14}{\sqrt{3}} = 14\sqrt{3}$ cm

12. One side of rhombus is 13 cm and one of its diagonals is 24 cm. What is the area of the rhombus?

A. 156 cm^2
B. 120 cm^2
C. 130 cm^2
D. 312 cm^2

$\triangle OBC$

$BC^2 = OB^2 + OC^2$

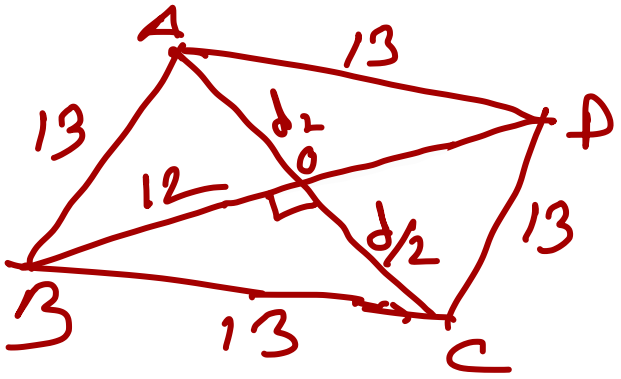
$\Rightarrow 13^2 = (12)^2 + (\delta/2)^2$

$\Rightarrow 169 = 144 + \delta^2/4$

$\Rightarrow \delta^2/4 = 25$

$\Rightarrow \delta^2 = 100$

$\therefore \delta = 10$



$= \frac{1}{2} \times 24 \times 10$

$= 120\ cm$

13. A circle is inscribed in an equilateral triangle and a square is inscribed in that circle. The ratio of the areas of the triangle and the square is

A. $\sqrt{3} : 4$
B. $\sqrt{3} : 8$
C. $3\sqrt{3} : 2$
D. $3\sqrt{3} : 1$

Diameter : x

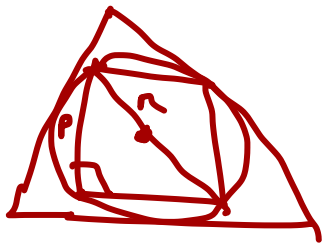
$x^2 = p^2 + p^2$

$\Rightarrow 2p^2 = x^2$

$\Rightarrow p^2 = \frac{x^2}{2}$

p

p^2



ROAD

$r = \frac{a}{2\sqrt{3}}$

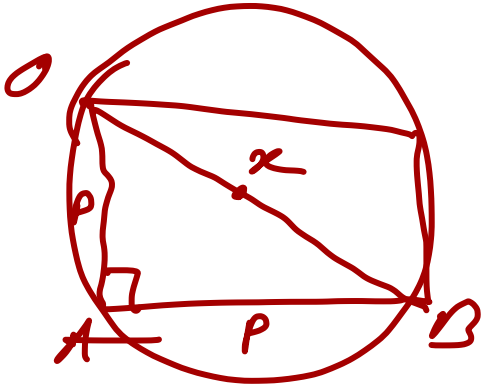
$\Rightarrow \frac{x}{2} = \frac{a}{2\sqrt{3}}$

$\Rightarrow a = x\sqrt{3}$

$\frac{\sqrt{3}}{4}(x\sqrt{3})^2 : x^2$

$\Rightarrow \frac{\sqrt{3}}{2} \times 3 : 1$

$\Rightarrow 3\sqrt{3} : 2$



14. A circular wire of length 168 cm is cut and bent in the form of rectangle whose sides are in the ratio of 5 : 7, what is the length (in cm) of the diagonal of rectangle?

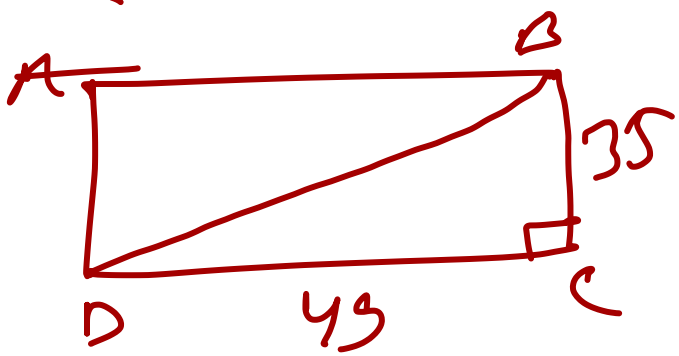
A. $\sqrt{4127}$
B. $\sqrt{2626}$
C. $\sqrt{1813}$
D. $\sqrt{3626}$

$2(5x + 7x) = 168$

$\Rightarrow 24x = 168$

$\Rightarrow x = 7$

35 49



$BD^2 = BC^2 + DC^2$

$= 35^2 + 49^2$

$= 1225 + 2401$

$\therefore BD = \sqrt{3626}$

15. The length of one side of a rhombus is 6.5 cm and its altitude is 10 cm. If the length of its diagonal be 26 cm, the length of the other diagonal will be:

A. 5 cm
B. 10 cm
C. 6.5 cm
D. 26 cm

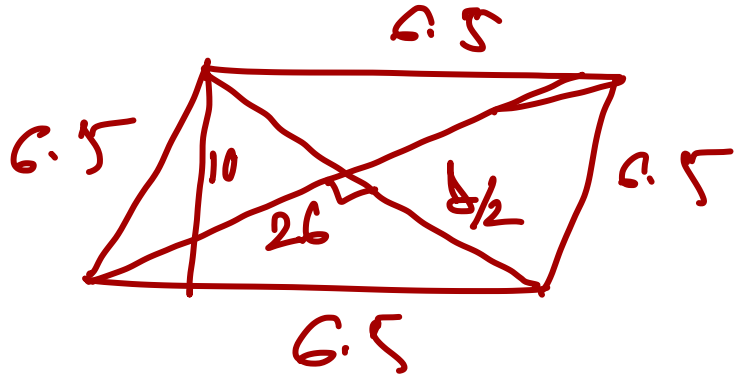
$\frac{1}{2} \times d_1 \times d_2$

(base × height)

$= 6.5 \times 10$

$\Rightarrow 65\ cm^2 = \frac{1}{2} \times 13 \times d_2$

$\Rightarrow d_2 = 5$



$(6.5)^2 = (13)^2 + (\frac{d}{2})^2$

$d = ?$

Thank You