Chapter 6. Changing the Subject of a Formula

Ex 6.1

Answer 1.

Let the simple interest =I

Now simple interest on sum of money = product of sum of money, number of years and rate percentage $= \frac{A \times I \times R}{100}$

As per the data $I = \frac{A \times I \times R}{100}$

Answer 2.

Let radius=r

Therefore, cube of radius=r^3

One third of times π the cube of the radius $= \frac{1}{3}\pi r^3$

As per the data: $V = \frac{1}{3}\pi r^3$

Answer 3.

Centigrade temperature= C

Nine –fifths of the centigrade temperature $= \frac{9}{5}C$

32 more than nine –fifths of the centigrade temperature $C = \frac{9}{5}C + 32$

As per the data: $F = \frac{9}{5}C + 32$

Answer 4.

Sum of a ,b, c, d, e=a+b+c+d+e

Number of quantities=5

Sum divided by the number of quantities $= \frac{a+b+c+d+e}{5}$

As per the data: $M = \frac{a+b+c+d+e}{5}$

Answer 5.

Object distance=u

Image distance =v

Reciprocal of Object distance= $\frac{1}{u}$

Reciprocal of Image distance= $\frac{1}{v}$

sum of reciprocals= $\frac{1}{u}+\frac{1}{v}$

Reciprocal of focal length= $\frac{1}{f}$

As per the data: $\frac{1}{f}=\frac{1}{u}+\frac{1}{v}$.

Answer 6.

Let the number of sides of the polygon=n

Number of sides of the polygon less 3 = n-3

As per the data: d=n-3

Answer 7.

Outer radius=R

Inner radius= r

The difference between the squares of outer radius R and inner radius

$r=R^2-r^2$

π times the difference between the squares of outer radius R and inner radius

$r=\pi\left(R^2-r^2\right)$

As per the data: $A=\pi\left(R^2-r^2\right)$

Answer 8.

Cost price of 25a articles=25a x 30p

Selling price of 25a articles= 25a x 20q

Now, Profit=Rs $\frac{25a\times 20q-25a\times 30p}{100}=\frac{50a(10q-15p)}{100}=$ Rs $\frac{a(10q-15p)}{2}$

As per the data: P= Rs $\frac{a(10q-15p)}{2}$

Answer 9.

We know that 1 hour= 60 minutes

1 minute=60 seconds

Number of minutes in x hours=60x

Number of minutes in y minutes=y

Number of minutes in z seconds= $\frac{z}{60}$

Total minutes=60x+y+ $\frac{z}{60}$

Answer 10.

Cost of 12 apples= x rupees (1 dozen=12)

Cost of 1 apple= $\frac{x}{12}$ rupees

Cost of 20 apples= $\frac{20x}{12}$ rupees

Cost of 20 mangoes= y rupees (1 score=20)

Cost of 1 mango= $\frac{y}{20}$ rupees

Cost of 30 mangoes= $\frac{30y}{20}$ rupees

Total cost= $\frac{20x}{12}+\frac{30y}{20}=\frac{20x}{12}+\frac{3y}{2}=\frac{20x+18y}{12}=\frac{10x+9y}{6}$

As per the data: C= $\frac{10x+9y}{6}$

Ex 6.2

Answer 1.

$$A = P\left(1+\frac{R}{100}\right)^N$$

$$\Rightarrow \frac{A}{P} = \left(1+\frac{R}{100}\right)^N$$

Taking N th root both sides

$$\Rightarrow \left(\frac{A}{P}\right)^{\frac{1}{N}} = \left(1+\frac{R}{100}\right)$$

$$\Rightarrow \left(\frac{A}{P}\right)^{\frac{1}{N}} - 1 = \frac{R}{100}$$

$$\Rightarrow 100\left(\left(\frac{A}{P}\right)^{\frac{1}{N}} - 1\right) = R$$

$$\Rightarrow R = 100\left(\sqrt[N]{\left(\frac{A}{P}\right)} - 1\right)$$

Answer 2.

$$T = 2\pi\sqrt{\frac{L}{G}}$$

$$\Rightarrow \frac{T}{2\pi} = \sqrt{\frac{L}{G}}$$

squaring both sides

$$\Rightarrow \left(\frac{T}{2\pi}\right)^2 = \frac{L}{G}$$

$$\Rightarrow G\left(\frac{T}{2\pi}\right)^2 = L$$

$$\Rightarrow L = \frac{GT^2}{4\pi^2}$$

Answer 3.

$$S = ut + \frac{1}{2}at^2$$

$$\Rightarrow S - ut = \frac{1}{2}at^2$$

$$\Rightarrow 2(S - ut) = at^2$$

$$\Rightarrow \frac{2(S - ut)}{t^2} = a$$

$$\Rightarrow a = \frac{2(S - ut)}{t^2}$$

Answer 4.

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

$$\Rightarrow \frac{x^2}{a^2} = 1 - \frac{y^2}{b^2}$$

$$\Rightarrow x^2 = a^2\left(1 - \frac{y^2}{b^2}\right) = a^2\left(\frac{b^2 - y^2}{b^2}\right)$$

Taking square root both sides

$$\Rightarrow x = \sqrt{a^2\left(\frac{b^2 - y^2}{b^2}\right)} = \frac{a}{b}\sqrt{b^2 - y^2}$$

Answer 5.

$$S = \frac{a(r^n - 1)}{r - 1}$$

$$\Rightarrow S(r - 1) = a(r^n - 1)$$

$$\Rightarrow \frac{S(r - 1)}{(r^n - 1)} = a$$

$$\Rightarrow a = \frac{S(r - 1)}{(r^n - 1)}$$

Answer 6.

$$\frac{1}{R}=\frac{1}{r_1}+\frac{1}{r_2}$$

$$\Rightarrow \frac{1}{r_2}=\frac{1}{R}-\frac{1}{r_1}$$

$$\Rightarrow \frac{1}{r_2}=\frac{r_1-R}{r_1R}$$

$$\Rightarrow r_2=\frac{Rr_1}{r_1-R}$$

Answer 7.

$$x=\sqrt{\frac{a+b}{a-b}}$$

squaring both sides

$$\Rightarrow x^2=\frac{a+b}{a-b}$$

$$\Rightarrow x^2(a-b)=a+b$$

$$\Rightarrow x^2a-x^2b=a+b$$

$$\Rightarrow x^2a-a=b+x^2b$$

$$\Rightarrow a\left(x^2-1\right)=b\left(x^2+1\right)$$

$$\Rightarrow a=\frac{b\left(x^2+1\right)}{\left(x^2-1\right)}$$

Answer 8.

$$W=pq+\frac{1}{2}Wy^2$$

$$\Rightarrow W-pq=\frac{1}{2}Wy^2$$

$$\Rightarrow 2(W-pq)=Wy^2$$

$$\Rightarrow \frac{2(W-pq)}{W}=y^2$$

$$\Rightarrow Y=\sqrt{\frac{2(W-pq)}{W}}$$

Answer 9.

$$I = \frac{NG}{R + Ny}$$
$$\Rightarrow I(R + Ny) = NG$$
$$\Rightarrow IR + INy = NG$$
$$\Rightarrow N(Iy - G) = -IR$$
$$\Rightarrow N = \frac{-IR}{(Iy - G)} = \frac{IR}{G - Iy}$$

Answer 10.

$$K = \frac{1}{2}MV^2$$
$$\Rightarrow 2K = MV^2$$
$$\Rightarrow \frac{2K}{M} = V^2$$
$$\Rightarrow \sqrt{\frac{2K}{M}} = V$$

Answer 11.

$$S = \frac{n}{2}\{2a + (n-1)d\}$$
$$\Rightarrow 2S = 2an + n(n-1)d$$
$$\Rightarrow 2S - 2an = n(n-1)d$$
$$\Rightarrow 2(S - an) = n(n-1)d$$
$$\Rightarrow d = \frac{2(S - an)}{n(n-1)}$$

Answer 12.

$$R^2 = 4\pi(R_1^2 - R_2^2)$$
$$\Rightarrow R^2 = 4\pi R_1^2 - 4\pi R_2^2$$
$$\Rightarrow 4\pi R_2^2 = 4\pi R_1^2 - R^2$$
$$\Rightarrow R_2^2 = \frac{4\pi R_1^2 - R^2}{4\pi}$$
$$\Rightarrow R_2 = \sqrt{\frac{4\pi R_1^2 - R^2}{4\pi}}$$

Answer 13.

$$R = \frac{m_1B + m_2A}{m_1 + m_2}$$

$$\Rightarrow R(m_1 + m_2) = m_1B + m_2A$$

$$\Rightarrow R(m_1 + m_2) - m_1B = m_2A$$

$$\Rightarrow \frac{R(m_1 + m_2) - m_1B}{m_2} = A$$

Answer 14.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\Rightarrow 2ax = -b \pm \sqrt{b^2 - 4ac}$$

$$\Rightarrow 2ax + b = \pm\sqrt{b^2 - 4ac}$$

Taking square both sides

$$\Rightarrow (2ax + b)^2 = b^2 - 4ac$$

$$\Rightarrow 4ac = b^2 - (2ax + b)^2$$

$$\Rightarrow c = \frac{b^2 - (2ax + b)^2}{4a}$$

Answer 15.

$$T = 2\pi\sqrt{\frac{k^2 + h^2}{hg}}$$

$$\Rightarrow \frac{T}{2\pi} = \sqrt{\frac{k^2 + h^2}{hg}}$$

Squaring both sides

$$\Rightarrow \left(\frac{T}{2\pi}\right)^2 = \frac{k^2 + h^2}{hg}$$

$$\Rightarrow hg\left(\frac{T}{2\pi}\right)^2 - h^2 = k^2$$

$$\Rightarrow k = \sqrt{\frac{T^2hg}{4\pi^2} - h^2}$$

Answer 16.

$mx + ny = p$

Substitute $y = ax + b$ in the above equation

$mx + n(ax + b) = p$

$\Rightarrow mx + anx + bn = p$

$\Rightarrow x(m + an) + bn = p$

$\Rightarrow x(m + an) = p - bn$

$\Rightarrow x = \frac{p - bn}{m + an}$

Answer 17.

$A = pr^2$....(i) and $C = 2pr$ .....(ii)

Divide (i) by (ii)

$\frac{A}{C} = \frac{pr^2}{2pr}$

$\Rightarrow \frac{A}{C} = \frac{r}{2}$

$\Rightarrow r = \frac{2A}{C}$....(Multiplying throughout by r)

Answer 18.

$V = \pi r^2 h$ and $S = 2\pi r^2 + 2\pi rh$

$S = 2\pi r^2 + 2\pi rh$

$\Rightarrow 2\pi rh = S - 2\pi r^2$

$\Rightarrow h = \frac{S - 2\pi r^2}{2\pi r}$

Substitute h in $V = \pi r^2 h$

$\Rightarrow V = \pi r^2 \left(\frac{S - 2\pi r^2}{2\pi r}\right)$

$\Rightarrow V = r\left(\frac{S - 2\pi r^2}{2}\right)$

$\Rightarrow V = \frac{Sr}{2} - \pi r^3$

Answer 19.

$$3ax + 2b^2 = 3bx + 2a^2$$
$$\Rightarrow 3ax - 3bx = 2a^2 - 2b^2$$
$$\Rightarrow x(3a - 3b) = 2a^2 - 2b^2$$
$$\Rightarrow x = \frac{2a^2 - 2b^2}{3a - 3b}$$
$$\Rightarrow x = \frac{2(a^2 - b^2)}{3(a - b)}$$
$$\Rightarrow x = \frac{2(a+b)(a-b)}{3(a-b)}$$
$$\Rightarrow x = \frac{2(a+b)}{3} \quad \ldots.(\because a \neq b)$$

Answer 20.

$$\text{Given } b = \frac{2a}{a-2}, \text{ and } c = \frac{4b-3}{3b+4}$$
$$\text{Substituting } b = \frac{2a}{a-2} \text{ in } c = \frac{4b-3}{3b+4}$$
$$c = \frac{4\left(\frac{2a}{a-2}\right) - 3}{3\left(\frac{2a}{a-2}\right) + 4}$$
$$\Rightarrow c = \frac{\frac{8a}{a-2} - 3}{\frac{6a}{a-2} + 4}$$
$$\Rightarrow c = \frac{\frac{8a - 3(a-2)}{a-2}}{\frac{6a + 4(a-2)}{a-2}}$$
$$\Rightarrow c = \frac{8a - 3(a-2)}{6a + 4(a-2)}$$
$$\Rightarrow c = \frac{8a - 3a + 6}{6a + 4a - 8}$$
$$\Rightarrow c = \frac{5a + 6}{10a - 8}$$

Ex 6.3

Answer 1.

$$R=\frac{h}{2}(a-b)$$

$$\Rightarrow 2R=h(a-b)$$

$$\Rightarrow h=\frac{2R}{a-b}$$

Substituting R=108, a=16 and b=12, we get

$$h=\frac{2\times 108}{16-12}=\frac{2\times 108}{4}=54$$

Answer 2.

$$v^2=u^2+2as$$

$$\Rightarrow v^2-u^2=2as$$

$$\Rightarrow s=\frac{v^2-u^2}{2a}$$

Substituting u=3, a=2 and v=5, we get

$$s=\frac{5^2-3^2}{2\times 2}=\frac{25-9}{4}=\frac{16}{4}=4$$

Answer 3.

$$x = \frac{1-y^2}{1+y^2}$$

$$\Rightarrow x\left(1+y^2\right) = 1-y^2$$
$$\Rightarrow x + xy^2 = 1-y^2$$
$$\Rightarrow xy^2 + y^2 = 1-x$$
$$\Rightarrow y^2(x+1) = 1-x$$
$$\Rightarrow y^2 = \frac{1-x}{1+x}$$
$$\Rightarrow y = \sqrt{\frac{1-x}{1+x}}$$

Substituting $x = \frac{3}{5}$, we get

$$y = \sqrt{\frac{1-\frac{3}{5}}{1+\frac{3}{5}}} = \sqrt{\frac{2}{8}} = \sqrt{\frac{1}{4}} = \frac{1}{2}$$

Answer 4.

$$S = \frac{n}{2}\{2a + (n-1)d\}$$

$$\Rightarrow 2S = n\{2a + (n-1)d\}$$
$$\Rightarrow \frac{2S}{n} = 2a + (n-1)d$$
$$\Rightarrow \frac{2S}{n} - (n-1)d = 2a$$
$$\Rightarrow \left\{\frac{S}{n} - \frac{(n-1)d}{2}\right\} = a$$

Substituting S=50, n=10 and d=2, we get

$$a = \left\{\frac{S}{n} - \frac{(n-1)d}{2}\right\} = \left\{\frac{50}{10} - \frac{9\times 2}{2}\right\} = 5 - 9 = -4$$

Answer 5.

$$a = 1 - \frac{2b}{cx - b}$$

$$\Rightarrow a - 1 = -\frac{2b}{cx - b}$$
$$\Rightarrow (a-1)(cx - b) + 2b = 0$$
$$\Rightarrow acx - ab - cx + 3b = 0$$
$$\Rightarrow x(ac - c) + b(3 - a) = 0$$
$$\Rightarrow xc(a-1) = -b(3-a)$$
$$\Rightarrow x = \frac{b(a-3)}{c(a-1)}$$

Substituting a=5, b=12 and c=2,we get

$$x = \frac{12(5-3)}{2(5-1)} = \frac{12 \times 2}{2 \times 4} = 3$$

Answer 6.

$$K = \sqrt{\frac{hg}{d^2} - a^2}$$

Squaring both sides, we get

$$\Rightarrow K^2 = \frac{hg}{d^2} - a^2$$
$$\Rightarrow K^2 + a^2 = \frac{hg}{d^2}$$
$$\Rightarrow \left(K^2 + a^2\right) d^2 = hg$$
$$\Rightarrow h = \frac{\left(K^2 + a^2\right) d^2}{g}$$

Substituting k=-2,a=-3,d=8 and g=32,we get

$$h = \frac{\left((-2)^2 + (-3)^2\right)(8)^2}{32} = \frac{(4+9)64}{32} = 26$$

Answer 7.

$$y = \frac{1-x^2}{1+x^2}$$

$$\Rightarrow y\left(1+x^2\right) = 1-x^2$$
$$\Rightarrow y + yx^2 = 1-x^2$$
$$\Rightarrow yx^2 + x^2 = 1-y$$
$$\Rightarrow x^2(1+y) = 1-y$$
$$\Rightarrow x^2 = \frac{1-y}{1+y}$$
$$\Rightarrow x = \sqrt{\frac{1-y}{1+y}}$$

Substituting $y=\frac{1}{2}$, we get

$$x = \sqrt{\frac{1-\frac{1}{2}}{1+\frac{1}{2}}} = \sqrt{\frac{1}{3}}$$

Answer 8.

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$\Rightarrow \frac{y}{b} = 1 - \frac{x}{a}$$
$$\Rightarrow \frac{y}{b} = \frac{a-x}{a}$$
$$\Rightarrow y = b\left(1-\frac{x}{a}\right)$$
$$\Rightarrow y = b - \frac{b}{a}x$$

Substituting $a=2, b=8$ and $x=5$, we get

$$y = 8 - \frac{8}{2}\times 5 = -12$$

Answer 9.

$$x = \frac{my}{14 - mt}$$

$$\Rightarrow (14 - mt)x = my$$

$$\Rightarrow 14x - mtx = my$$

$$\Rightarrow -mtx - my = -14x$$

$$\Rightarrow m(tx + y) = 14x$$

$$\Rightarrow m = \frac{14x}{tx + y}$$

Substituting x=6,y=10 and t=3

$$m = \frac{14 \times 6}{3 \times 6 + 10} = \frac{14 \times 6}{28} = 3$$

Answer 10.

$$M = L + \frac{1}{F}\left(\frac{1}{2}N - C\right) \times I$$

$$\Rightarrow M - L = \frac{1}{F}\left(\frac{1}{2}N - C\right) \times I$$

$$\Rightarrow F(M - L) = \left(\frac{1}{2}N - C\right) \times I$$

$$\Rightarrow F(M - L) = \left(\frac{N - 2C}{2}\right) \times I$$

$$\Rightarrow \frac{2F(M - L)}{(N - 2C)} = I$$

Substituting the values of M=44,L=20,F=15,N=50 and C=30,we get

$$I = \frac{2F(M - L)}{(N - 2C)} = \frac{2 \times 15(44 - 20)}{50 - 2 \times 13}$$

$$= \frac{30 \times 24}{24} = 30$$

Answer 11.

$$v^2 = u^2 - 2gh$$
$$\Rightarrow 2gh = u^2 - v^2$$
$$\Rightarrow g = \frac{u^2 - v^2}{2h}$$

Substituting the values of v=9.8,u=41.5 and h=25.4.

$$g = \frac{41.5^2 - 9.8^2}{2 \times 25.4} = \frac{(41.5 + 9.8)(41.5 - 9.8)}{50.8} = \frac{51.3 \times 31.7}{50.8}$$
$$= 32.01 = 32$$

Answer 12.

$$D = \sqrt{\left(\frac{f+p}{f-p}\right)}$$

squaring both sides, we get

$$\Rightarrow D^2 = \left(\frac{f+p}{f-p}\right)$$
$$\Rightarrow D^2(f-p) = (f+p)$$
$$\Rightarrow D^2 f - D^2 p = f + p$$
$$\Rightarrow D^2 f - f = p + D^2 p$$
$$\Rightarrow f\left(D^2 - 1\right) = p\left(D^2 + 1\right)$$
$$\Rightarrow f = \frac{p\left(D^2 + 1\right)}{\left(D^2 - 1\right)}$$

Substituting the values of D=13 and p=21

$$f = \frac{21\left(13^2 + 1\right)}{\left(13^2 - 1\right)} = \frac{21 \times 170}{168} = 21.25$$

Answer 13.

$$y = \frac{2z+1}{2z-1}$$

$$\Rightarrow (2z-1)y = 2z+1$$
$$\Rightarrow 2zy - y = 2z+1$$

$$\Rightarrow 2zy - 2z = 1+y$$
$$\Rightarrow z(2y-1) = 1+y$$
$$\Rightarrow z = \frac{1+y}{2y-1}$$

$$x = \frac{y+1}{y-1}$$

$$\Rightarrow x = \frac{\left(\frac{2z+1}{2z-1}\right)+1}{\left(\frac{2z+1}{2z-1}\right)-1} = \frac{2z+1+2z-1}{2z+1-2z+1}$$

$$= \frac{4z}{2} = 2z$$

$$\Rightarrow z = \frac{x}{2}$$

Substituting $x = 34$, we get

$$z = \frac{34}{2} = 17$$

Answer 14.

$a=b(1+ct)$

$$\Rightarrow a = b + bct$$
$$\Rightarrow bct = a - b$$
$$\Rightarrow c = \frac{a-b}{bt}$$

Substituting $a=1100, b=100$ and $t=4$, we get

$$c = \frac{1100-100}{100\times 4} = 2.5$$

Answer 15.

Volume of cylinder=V

Product of π and square of radius r and the height $h = \pi r^2 h$

i.e $V = \pi r^2 h$

$$V = \pi r^2 h$$
$$\Rightarrow \frac{V}{h\pi} = r^2$$
$$\Rightarrow r = \sqrt{\frac{V}{\pi h}}$$

When $V = 44cm^3, \pi = 22/7, h = 14cm$

$$\Rightarrow r = \sqrt{\frac{44}{\frac{22}{7} \times 14}} = \sqrt{1} = 1cm$$

Answer 16.

Volume of cone=V

Product of one third of π and square of radius r of the base and the height $h = \frac{1}{3}\pi r^2 h$

So, $V = \frac{1}{3}\pi r^2 h$

$$\Rightarrow \frac{3V}{\pi h} = r^2$$
$$\Rightarrow r = \sqrt{\frac{3V}{\pi h}}$$

Substituting $V = 1232cm^3, \pi = \frac{22}{7}, h = 24cm$

$$\Rightarrow r = \sqrt{\frac{3 \times 1232}{\frac{22}{7} \times 24}} = \sqrt{49} = 7cm$$

Answer 17.

Given that when $P = 4$, $V = 2\frac{1}{2} = \frac{5}{2}$

$PV = C$

$\Rightarrow 4\left(\frac{5}{2}\right) = C$

$\Rightarrow C = 10$

If $V = 4$, then

$PV = C$

$\Rightarrow P(4) = (10)$

$\Rightarrow P = \frac{10}{4}$

$\Rightarrow P = \frac{5}{2}$

Answer 18A.

$E = \frac{1}{2} m v^2 + mgh$

$\Rightarrow E = m\left(\frac{1}{2} v^2 + gh\right)$

$\Rightarrow m = \frac{E}{\frac{1}{2} v^2 + gh}$

$\Rightarrow m = \frac{E}{\frac{v^2 + 2gh}{2}}$

$\Rightarrow m = \frac{2E}{v^2 + 2gh}$

Answer 18B.

$$E = \frac{1}{2}m\upsilon^2 + mgh$$

$$\Rightarrow E = m\left(\frac{1}{2}\upsilon^2 + gh\right)$$

$$\Rightarrow m = \frac{E}{\frac{1}{2}\upsilon^2 + gh}$$

$$\Rightarrow m = \frac{E}{\frac{\upsilon^2 + 2gh}{2}}$$

$$\Rightarrow m = \frac{2E}{\upsilon^2 + 2gh}$$

Given that $v = 2$, $g = 10$, $h = 5$ and $E = 104$

$$\Rightarrow m = \frac{2(104)}{(2)^2 + 2(10)(5)}$$

$$\Rightarrow m = \frac{208}{4 + 100}$$

$$\Rightarrow m = 2$$

Answer 19.

$$s = \frac{n}{2}[2a + (n-1)d]$$

$$\Rightarrow s = an + \frac{n(n-1)d}{2}$$

$$\Rightarrow s - an = \frac{n(n-1)d}{2}$$

$$\Rightarrow \left(\frac{2s - 2an}{n(n-1)}\right) = d$$

$$\Rightarrow d = \frac{2}{n(n-1)}(s - an)$$

Given that $n = 3$, $a = n + 1$ and $s = 18$

Since $a = n + 1 \Rightarrow a = 3 + 1 = 4$

Substituting we get

$$\Rightarrow d = \frac{2}{3(3-1)}(18 - (4)(3))$$

$$\Rightarrow d = \frac{2}{3(2)}(18 - 12)$$

$$\Rightarrow d = \frac{1}{3}(6)$$

$$\Rightarrow d = 2$$

Answer 20.

Radius of bigger circle=R

Radius of smaller circle=r

$$\text{Area} = A = \pi\left(R^2 - r^2\right)$$

$$\Rightarrow A = \pi\left(R^2 - r^2\right)$$

$$\Rightarrow \frac{A}{\pi} = R^2 - r^2$$

$$\Rightarrow r^2 = R^2 - \frac{A}{\pi}$$

$$\Rightarrow r = \sqrt{R^2 - \frac{A}{\pi}}$$

$$\text{Putting } A = 88\text{cm}^2 \text{ and } R = 8\text{cm}$$

$$\Rightarrow r = \sqrt{8^2 - \frac{88}{\frac{22}{7}}} = 6\text{cm}$$