

1.  $d = 15 \rightarrow r = 7.5$ . So the area of the face of the clock is  $\pi r^2 = \pi(7.5)^2 = \boxed{56.25\pi \text{ ft}^2}$ .

The hour hand is 7 ft long, so the radius of the circle passed over by the hour hand is  $r = 7$ . The tip of the hour hand travels the circumference of the circle with  $r = 7$  in 12 hours, so  $C = 2\pi r = 2\pi(7) = 14\pi$ . It travels  $\frac{1}{12}$  of the way around the circle in 1 hour, so the tip of the hour hand travels  $14\pi \times \frac{1}{12} = \boxed{\frac{7\pi}{6} \text{ ft}}$

2. Area of the shaded area = area of big half circle – area of smaller half circle – area of smallest half circle.

Area of big half circle =  $\frac{\pi r^2}{2}$ . The big half circle has diameter  $12 + 5 = 17$ , so the radius is  $r = 8.5$ . So  $Area_{big} = \frac{\pi(8.5)^2}{2} = 36.125\pi$ .

Area of smaller half circle. The smaller half circle has diameter 12, so the radius is 6. So  $Area_{smaller} = \frac{\pi(6)^2}{2} = 18\pi$ .

Area of smallest half circle. The smallest half circle has diameter 5, so the radius is 2.5. So  $Area_{smallest} = \frac{\pi(2.5)^2}{2} = 3.125\pi$ .

Shaded area =  $36.125\pi - 18\pi - 3.125\pi = \boxed{15\pi}$ .

Perimeter of the shaded area = circumference of big half circle + circumference of smaller half circle + circumference of smallest half circle.

Circumference of half circle =  $\frac{2\pi r}{2} = \pi r$ .

Circumference of big half circle:  $r = 8.5$ , so  $C_{big} = 8.5\pi$ .

Circumference of smaller half circle:  $r = 6$ , so  $C_{smaller} = 6\pi$ .

Circumference of smallest half circle:  $r = 2.5$ , so  $C_{smallest} = 2.5\pi$ .

Perimeter of shaded area =  $8.5\pi + 6\pi + 2.5\pi = \boxed{P = 17\pi}$

3. To find the length of the curve, we need to find circumference of small half circle + circumference of medium circle + circumference of large half circle.

Circumference of small half circle. It has  $r = 28$ , so  $C = \pi r = 28\pi$ .

Circumference of medium circle. It has  $r = 42$ , so  $C = 2\pi r = 2\pi(42) = 84\pi$ .

Circumference of large half circle. It has  $r = 56$ , so  $C = \pi r = 56\pi$ .

Length of curve =  $28\pi + 84\pi + 56\pi = \boxed{168\pi}$

4. (a)  $\boxed{2}$  (b)  $\boxed{1:4}$

5.  $\boxed{\text{a) } 200 - 50\pi \text{ b) } 54\pi \text{ c) } 4\pi - 8}$

6. The radius of the table is half of 1 m, or 50 cm. The radius of the circular table cloth is the radius of the table plus an extra 10 cm, so 60 cm.

Find the area of the table cloth:  $A = \pi r^2 = \pi(60)^2 = 3600\pi \text{ cm}^2$ .



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Now find the area of the table:  $A = \pi r^2 = \pi 50^2 = 2500\pi \text{ cm}^2$ .

Now subtract:  $3600\pi - 2500\pi = \boxed{1100\pi \text{ cm}^2}$

7. (a)  $\boxed{2 \text{ cm}}$  (b)  $\boxed{16\pi \text{ cm}}$