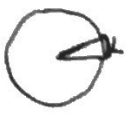
12.1.10

a) $a = 30°$, $C = 36$ cm



$L = \left(\frac{30°}{360°}\right)C = \frac{1}{12}C = \boxed{3 \text{ cm}}$

b) $a = 72°$, $r = 2$ ft

$L = \left(\frac{a°}{360°}\right)\cdot C = \left(\frac{72}{360}\right)\cdot 2\pi r = \frac{1}{5}\cdot 2\pi \cdot 2 = \boxed{\frac{4}{5}\pi \text{ ft} \approx 2.512 \text{ ft}}$

c) 

$C = 54$ in

$L = \left(\frac{145}{360}\right)54 = \frac{29}{72}\cdot\frac{\cancel{54}^{3}}{\cancel{8}_{4}} = 29\cdot\frac{3}{4} = \boxed{21.75 \text{ in.}}$

d) 

$L = \left(\frac{150}{360}\right)2\pi\cdot 3 = \boxed{\frac{5}{4}\pi} \approx \boxed{7.85 \text{ m}}$

12.1.14

a) $A = \frac{98}{360}\cdot\pi(12)^2 \approx \boxed{39.2\pi \approx 123.15 \text{ mm}^2}$

b) 

$A = \left(\frac{160}{360}\right)\pi(3)^2 = \boxed{4\pi \approx 12.56 \text{ ft}^2}$

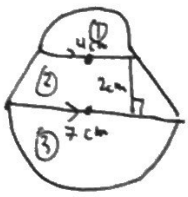
c) $a = 27°$, $d = 10$ cm, so $r = 5$ cm

so $A = \left(\frac{27°}{360°}\right)\pi(5)^2 = \boxed{1.875\pi \approx 5.89 \text{ cm}^2}$

d) $a = 80°$, $d = 30$ in., $r = 15$ in.

$A = \left(\frac{80°}{360°}\right)\pi(15)^2 = \boxed{50\pi \approx 157 \text{ in}^2}$

12.1.16

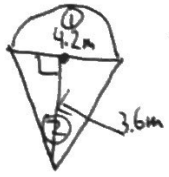
a) 

Area of ①: $\frac{1}{2}\pi\left(\frac{4}{2}\right)^2 = 2\pi \text{ cm}^2$

Area of ②: $\frac{1}{2}(2)(4+7) = 11 \text{ cm}^2$

Area of ③: $\frac{1}{2}\pi\left(\frac{7}{2}\right)^2 = \frac{49}{8}\pi \text{ cm}^2$

Total: $\boxed{\frac{65}{8}\pi + 11 \text{ cm}^2 \approx 36.51 \text{ cm}^2}$

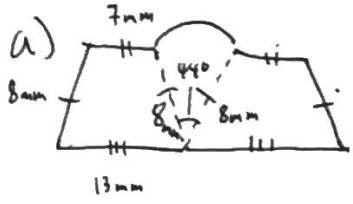
b) 

Area of ⌓, ①: $\frac{1}{2}\pi\left(\frac{4.2}{2}\right)^2 = \frac{1}{2}\pi\cdot 2.1^2 = \boxed{2.205\pi \approx 6.92 \text{ m}^2}$

Area of ▽, ②: $\frac{1}{2}(3.6)(4.2) = \boxed{7.56 \text{ m}^2}$

Total: $7.56 + 6.92 = \boxed{14.48 \text{ m}^2}$ or $\boxed{2.205\pi + 7.56 \text{ m}^2}$

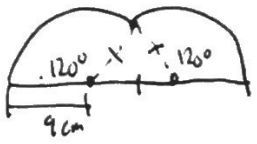
12.1.18

a) 

$P = \text{⌒} + \text{⏢} + \text{⌒}$

$= (7+8+13) + (7+8+13) + \left(\frac{44°}{360°}\right)(2\pi\cdot 8)$

$\approx 56 + 6.14 = \boxed{62.14 \text{ mm}}$

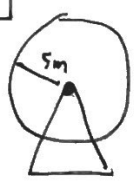
b) 

Each arc is a sector of a circle of radius 9 cm, so the three sides marked — are 9 cm. So: $P =$ ⌒ + ⌒ + ⏢

$= \frac{1}{3}2\pi\cdot 9 + \frac{1}{3}2\pi\cdot 9 + 3\cdot 9$

$= \boxed{12\pi + 27 \text{ cm}} \approx \boxed{64.68 \text{ cm}}$

12.1.26

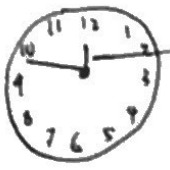


Speed of Ferris wheel is 157 m/min.

15 full rotations in one ride.

Each car travels $2\pi r = 10\pi$ m in one full rotation, so 150π m in one ride. At 157 m/min this takes $\frac{150\pi \text{ m}}{157 \text{ m/min}} = \boxed{3 \text{ min}}$

12.1.28 . Minute hand is 50% longer than hour hand so it is $1.5 \cdot 42 = 63$ mm long.



a) 

In 15 min, the minute hand travels $\frac{1}{4}$ of the distance around the clock:

$L = \frac{1}{4} \cdot 2\pi \cdot 63 = \boxed{31.5\pi \text{ mm} \approx 98.91 \text{ mm}}$

b) In 1 hour, the minute hand goes all the way around the clock:

$L_{min} = 2\pi \cdot 63 = 126\pi$ mm

Now the hour hand goes $\frac{1}{12}$ of the way around:

$L_{hour} = \frac{1}{12} \cdot 2\pi \cdot 42 = 7\pi$ mm.

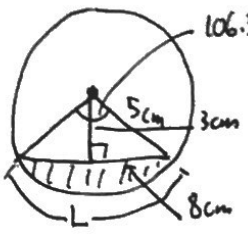
So the minute hand goes $126\pi - 7\pi = \boxed{119\pi \approx 373.66 \text{ mm further.}}$

12.1.32 This is your quiz 6 problem!!!

$d = 12$ in. So $r = 6$ in.

$$\begin{aligned} A_{shaded} &= A_{\bigcirc} - A_{\triangle} \\ &= \pi r^2 - \tfrac{1}{2}bh \\ &= \pi(6)^2 - \tfrac{1}{2}(6)(6) \\ &= \boxed{36\pi - 18 \text{ in}^2} \\ &\approx \boxed{95.04 \text{ in}^2} \end{aligned}$$

12.1.34 $L = \left(\frac{106.3^\circ}{360^\circ}\right) 2\pi r = \left(\frac{106.3}{360^\circ}\right) \cdot 2\pi \cdot 5 = \boxed{9.27 \text{ cm}}$ +1



$$\begin{aligned} A_{shaded} &= \overset{+1}{A_{sector}} - A_{\triangle} \\ &= \left(\frac{106.3^\circ}{360^\circ}\right)\pi(5)^2 - \tfrac{1}{2} \cdot 3 \cdot 8 \ +1 \\ &= 23.18 - 12 \\ &= \boxed{11.18 \text{ cm}^2} \ +1 \end{aligned}$$

12.1.40 It is greater than. A semicircle of radius x has area $\frac{1}{2}\pi x^2$, while a circle of radius $\frac{1}{2}x$ has area $\pi\left(\frac{1}{2}x\right)^2 = \frac{1}{4}\pi x^2$.