Winter Quiz 5

MATH 100:11 Mathematical Concepts
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Name: SOLUTIONS

Some useful formulae:

(a) Area of triangle is $(1/2)bh$

(b) Circumference of circle of radius r is $2\pi r$, area is πr^2

(c) Pythagoras: $a^2 + b^2 = c^2$ for right triangles

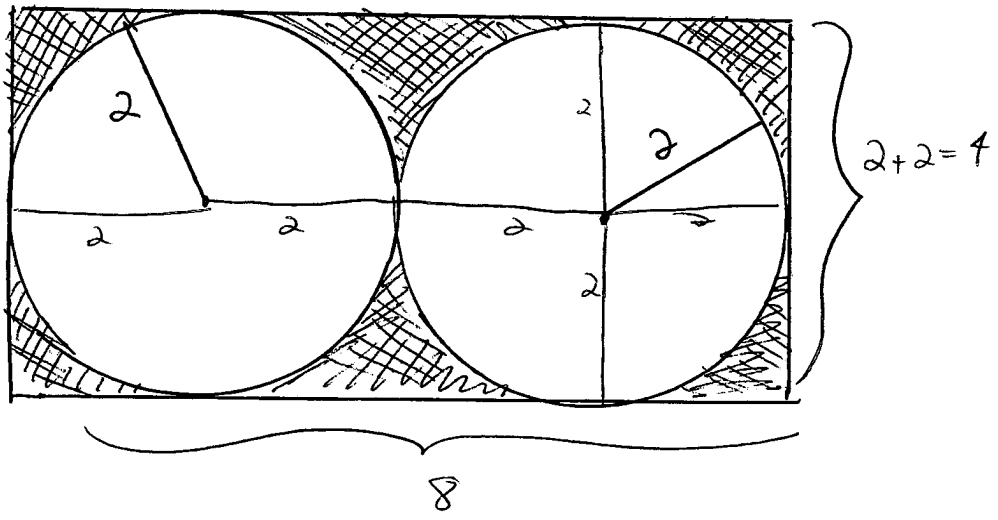
(d) Rectangle of length l and width w has area $A = lw$ and perimeter $P = 2l + 2w$

(e) Area of a parallelogram is bh

1. Find the area of the shaded region: [3]

(outer quadrilateral is a rectangle)

each circle has radius 2 so has area $\pi r^2 = \pi 2^2 = 4\pi$



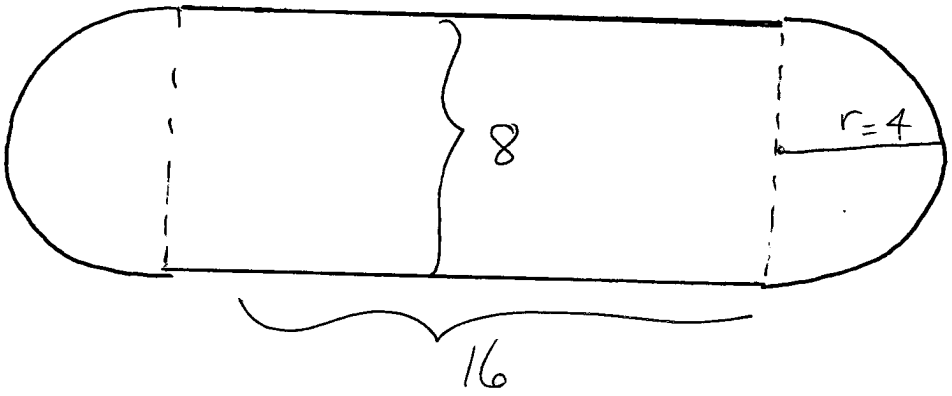
area of shaded region = area of rectangle − area of 2 circles

$= 8 \times 4 - 2(4\pi)$

$= \boxed{32 - 8\pi}$

2. A racetrack is the shape of a rectangle with semi-circles at each end as in the diagram. Find the perimeter and area. [4]

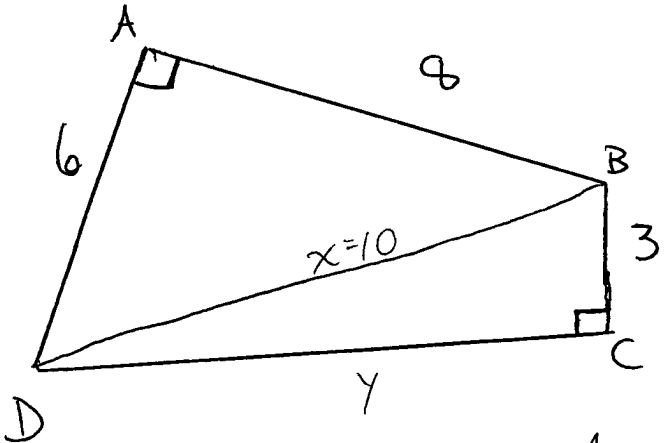
$2\frac{1}{2}$ circles = 1 circle



total area
$= 16 \times 8 + \pi 4^2$
$= 128 + 16\pi$

perimeter $= 2\pi r + 16 + 16$
$= 2\pi(4) + 32$
$= 8\pi + 32$

3. Find the area of the quadrilateral assuming angles A and C are right angles: [3]



$6^2 + 8^2 = x^2$
$\rightarrow 36 + 64 = 100 = x^2 \rightarrow x = 10$

$y^2 + 3^2 = 10^2$
$\rightarrow y^2 = 10^2 - 3^2 = 100 - 9 = 91$
$y = \sqrt{91}$

area = area $\triangle ABD + \triangle BCD$
$= \frac{1}{2}(8)(6) + \frac{1}{2}(3)(\sqrt{91}) = 24 + \frac{3}{2}\sqrt{91}$