03 - Formulae and Functions

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Outline

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Formulae

Area of a Circle	Circumference of a Circle	Area of a Rectangle	Perimeter of a Rectangle
πr^2	$2\pi r$	$l \times w$	$2 \times l + 2 \times w$
Area of a Triangle	**Surface Area of a Sphere**	**Volume of a Sphere**	**Quadratic Formula**
$\frac{1}{2}bh$	$4\pi r^2$	$\frac{4}{3}\pi r^3$	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$\pi = 3.14159265358979323846264338327 9\ldots$$

- A formula is a way of writing down a generic computation so it can be repeated as many times as needed.

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- A formula is a way of writing down a generic computation so it can be repeated as many times as needed.
- Letters serve as placeholders for numbers. (We refer to these as variables.)
- To apply a formula, we just fill in the numbers.

Examples

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1. $A = \pi r^2$
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3. $A = 3.14 \times 16\text{cm}^2$
4. $A = 50.24\text{cm}^2$

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7. $C = 6.28 \times 4\text{cm}$
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1. $P = 2 \times l + 2 \times w$
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5. $P = 346\frac{2}{3}\text{yd}$
6. $A = l \times w$
7. $A = 120\text{yd} \times 53\frac{1}{3}\text{yd}$
8. $A = 6,400\text{yd}^2$

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5. $S = 314\text{in}^2$
6. $A = \frac{4}{3}\pi r^3$
7. $A = \frac{4}{3} \times 3.14 \times (5\text{in})^3$
8. $A = \frac{4}{3} \times 3.14 \times 125\text{in}^3$

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9. $A \approx 1.33 \times 3.14 \times 125\text{in}^3$

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8. $A = \frac{4}{3} \times 3.14 \times 125\text{in}^3$
9. $A \approx 1.33 \times 3.14 \times 125\text{in}^3$
10. $A \approx 4.18 \times 125\text{in}^3$

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8. $A = \frac{4}{3} \times 3.14 \times 125\text{in}^3$
9. $A \approx 1.33 \times 3.14 \times 125\text{in}^3$
10. $A \approx 4.18 \times 125\text{in}^3$
11. $A \approx 522.5\text{in}^3$

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- Note that $f(x)$ is the notation that means "Function of x" and not $f \cdot x$.

Examples

Write each of the geometric formulae from the previous section as a function.

Area of a Circle

Area of a Triangle

Circumference of a Circle

Surface Area of A Sphere

Area of a Rectangle

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Write each of the geometric formulae from the previous section as a function.

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2. $A(r) = \pi r^2$

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2. $c(r) = 2\pi r$

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Area of a Rectangle

1. $l \times w$

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1. $l \times w$
2. $A(l, w) = l \times w$

Perimeter of a Rectangle

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Area of a Rectangle

1. $l \times w$
2. $A(l, w) = l \times w$

Perimeter of a Rectangle

1. $P(l, w) = 2 \times l + 2 \times w$

Area of a Triangle

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Area of a Triangle

1. $\frac{1}{2}bh$

Surface Area of A Sphere

Volume of a Sphere

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Area of a Rectangle

1. $l \times w$
2. $A(l, w) = l \times w$

Perimeter of a Rectangle

1. $P(l, w) = 2 \times l + 2 \times w$

Area of a Triangle

1. $\frac{1}{2}bh$
2. $A(b, h) = \frac{1}{2}bh$

Surface Area of A Sphere

Volume of a Sphere

Examples

Write each of the geometric formulae from the previous section as a function.

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1. πr^2
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Area of a Rectangle

1. $l \times w$
2. $A(l, w) = l \times w$

Perimeter of a Rectangle

1. $P(l, w) = 2 \times l + 2 \times w$

Area of a Triangle

1. $\frac{1}{2}bh$
2. $A(b, h) = \frac{1}{2}bh$

Surface Area of A Sphere

1. $4\pi r^2$

Volume of a Sphere

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Write each of the geometric formulae from the previous section as a function.

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1. $l \times w$
2. $A(l, w) = l \times w$

Perimeter of a Rectangle

1. $P(l, w) = 2 \times l + 2 \times w$

Area of a Triangle

1. $\frac{1}{2}bh$
2. $A(b, h) = \frac{1}{2}bh$

Surface Area of A Sphere

1. $4\pi r^2$
2. $S(r) = 4\pi r^2$

Volume of a Sphere

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Area of a Rectangle

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Perimeter of a Rectangle

1. $P(l, w) = 2 \times l + 2 \times w$

Area of a Triangle

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2. $A(b, h) = \frac{1}{2}bh$

Surface Area of A Sphere

1. $4\pi r^2$
2. $S(r) = 4\pi r^2$

Volume of a Sphere

1. $\frac{4}{3}\pi r^3$

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Write each of the geometric formulae from the previous section as a function.

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Surface Area of A Sphere

1. $4\pi r^2$
2. $S(r) = 4\pi r^2$

Volume of a Sphere

1. $\frac{4}{3}\pi r^3$
2. $V(r) = \frac{4}{3}\pi r^3$

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Examples

In the first half of a basketball game, team A scored 60 points and team B scored 70 points. In the second half, team A scores 7 points per minute and team B scores 8 points per minute.

Write two functions, one for team A and one for team B, representing each team's respective score in the second half. If the second half of the game comprises 24 minutes of play, which team wins the game?

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1. $s_a(x) = 60 + 7x$

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1. $s_a(x) = 60 + 7x$
2. $s_a(24) = 60 + 7 \cdot 24$

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1. $s_a(x) = 60 + 7x$
2. $s_a(24) = 60 + 7 \cdot 24$
3. $s_a(24) = 60 + 168$

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2. $s_a(24) = 60 + 7 \cdot 24$
3. $s_a(24) = 60 + 168$
4. $s_a(24) = 228$

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2. $s_a(24) = 60 + 7 \cdot 24$
3. $s_a(24) = 60 + 168$
4. $s_a(24) = 228$

1. $s_b(x) = 70 + 8x$
2. $s_b(24) = 70 + 8 \cdot 24$
3. $s_b(24) = 70 + 192$

Examples

In the first half of a basketball game, team A scored 60 points and team B scored 70 points. In the second half, team A scores 7 points per minute and team B scores 8 points per minute.

Write two functions, one for team A and one for team B, representing each team's respective score in the second half. If the second half of the game comprises 24 minutes of play, which team wins the game?

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2. $s_a(24) = 60 + 7 \cdot 24$
3. $s_a(24) = 60 + 168$
4. $s_a(24) = 228$

1. $s_b(x) = 70 + 8x$
2. $s_b(24) = 70 + 8 \cdot 24$
3. $s_b(24) = 70 + 192$
4. $s_b(24) = 262$

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4. $s_a(24) = 228$

1. $s_b(x) = 70 + 8x$
2. $s_b(24) = 70 + 8 \cdot 24$
3. $s_b(24) = 70 + 192$
4. $s_b(24) = 262$
5. Team B wins!