Rational Expressions ⇨ Extra Applications
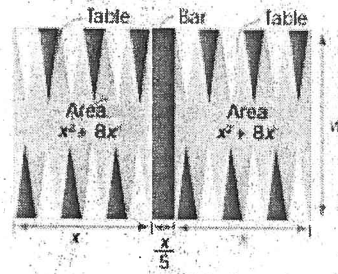
1. A backgammon game board consists of two rectangles of the same size, known as tables, separated by a divider, called the bar. The area of each table on a backgammon board can be modelled by the expression $x^2 + 8x$, and the width of each table by x. Write and simplify an expression that represents the width, w, of the whole board in terms of x.
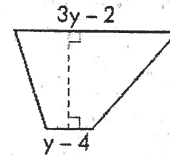
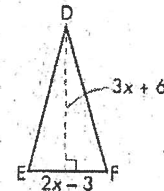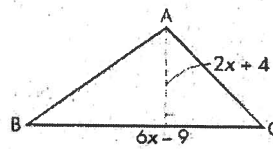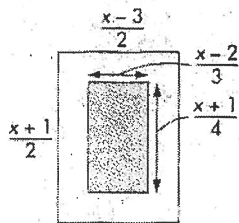2. Write the area of the rectangle in simplest form.

$$\frac{x^2 - 9}{x}$$

$$\frac{x^3 - 4x}{x^2 + 5x + 6}$$

3. The area of the trapezoid is $6y^2 - 5y - 6$. What is the height?

$$A = h\frac{(b_1 + b_2)}{2}$$

$3y - 2$

$y - 4$

4. Write and simplify an expression that represents the ratio of the area of $\triangle ABC$ to the area of $\triangle DEF$.

$\frac{x - 3}{2}$

$\frac{x - 2}{3}$

$\frac{x + 1}{4}$

$\frac{x + 1}{2}$

$2x + 4$

$6x - 9$

$3x + 6$

$2x - 3$

5. Write and simplify an expression that represents the fraction of the area of the large rectangle covered by the shaded rectangle.

6. Two triangles have the same base length, represented by x. The height of one triangle is $x + 1$. The height of the other triangle is $x + 3$. Write and simplify an expression that represents the total area of the two triangle.

7. Find the ratio of the volume to the surface area for the rectangular prism shown. Simplify if possible.

$x + 4$

$2x - 2$

$x + 4$
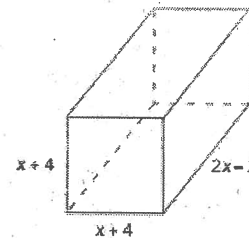
8. The diameter of the smaller circle is d. The diameter of the larger circle is $d + 1$. Write and simplify an expression that represents the area of the shaded part of the diagram in terms of d.

$d + 1$

d
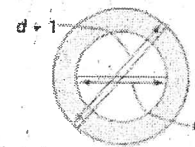
9. Two rectangles have common sides with a right triangle, as shown. The areas and widths of the rectangles are as indicated. Write and simplify an expression for the area of the triangle.

$x - 1$

$A = 2x^2 + 10x + 12$

$x + 2$

$A = 2x^2 - 3x + 1$
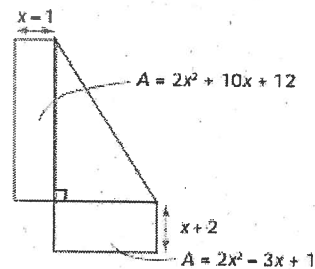
10. Find a simplified expression for the area of a rectangle with sides $\frac{5}{x+3} + \frac{2}{x-1}$ and $\frac{x-2}{x^2+x-6}$.

Answers:

1. $x + 8, x > 0$ 2. $(x - 2)(x - 3), x > 3$ 3. $3y + 2, y > \frac{3}{2}$ 4. $2, x > \frac{3}{2}$ 5. $\frac{x-2}{3(x-3)}, x > 3$ 6. $x(x + 2), x > 0$

7. $\frac{(x+4)(x-1)}{5x}, x > 1$ 8. $\frac{\pi(2d+1)}{4}, d > 0$ 9. $(2x - 1)(x + 3), x > 1$ 10. $\frac{7x+1}{(x-1)(x+3)^2}, x > 2$