1) Factor each of the following expressions if possible.

a) $15w + 25z$

$$= 5\left(\frac{15w}{5} + \frac{25z}{5}\right)$$

$$= 5(3w + 5z)$$

b) $17ca - 8cd$

$$= c\left(\frac{17ca}{c} - \frac{8cd}{c}\right)$$

$$= c(17a - 8d)$$

c) $12b^4 + 18b^2$

$$= 6b^2\left(\frac{12b^4}{6b^2} + \frac{18b^2}{6b^2}\right)$$

$$= 6b^2(2b^2 + 3)$$

d) $7h + 3m - 5k$

not factorable

2) Factor each of the following expressions if possible.

a) $14x^2y + 16xy^3$

$$= 2xy\left(\frac{14x^2y}{2xy} + \frac{16xy^3}{2xy}\right)$$

$$= 2xy(7x + 8y^2)$$

b) $8s^2y + 11t^3$

not factorable

c) $7gh + 2mn - 13pq$

not factorable

d) $27r^2s^2 - 18r^3s^2 - 36rs^3$

$$= 9rs^2\left(\frac{27r^2s^2}{9rs^2} - \frac{18r^3s^2}{9rs^2} - \frac{36rs^3}{9rs^2}\right)$$

$$= 9rs^2(3r - 2r^2 - 4s)$$

3) Factor each of the following expressions if possible.

a) $3x(x + 8) + 5(x + 8)$

$$= (x+8)\left[\frac{3x(x+8)}{x+8} + \frac{5(x+8)}{x+8}\right]$$

$$= (x+8)(3x+5)$$

b) $a(b + 1) + 9c(b + 1)$

$$= (b+1)\left[\frac{a(b+1)}{b+1} + \frac{9c(b+1)}{b+1}\right]$$

$$= (b+1)(a+9c)$$

c) $2y(x - 5) + 4(x + 5)$

not factorable

4) Factor each of the following expressions if possible.

a) $mx + my + 2x + 2y$

$= m(x+y) + 2(x+y)$
$= (x+y)(m+2)$

b) $x^2 + 3x + 2x + 6$

$= x(x+3) + 2(x+3)$
$= (x+3)(x+2)$

c) $ay^2 + 3ay + 4y + 12$

$= ay(y+3) + 4(y+3)$
$= (y+3)(ay+4)$

5) The formula for the surface area of a cylinder is $SA = 2\pi r^2 + 2\pi rh$

a) Write the formula in factored form

$SA = 2\pi r(r+h)$

b) If $r = 3$ and $h = 8$, find the surface area using both the original and factored form equations.

$SA = 2\pi(3)^2 + 2\pi(3)(8)$
$= 18\pi + 48\pi$
$= 66\pi \text{ units}^2$

$SA = 2\pi(3)(3+8)$
$= 6\pi(11)$
$= 66\pi \text{ units}^2$

6) Factor, if possible.

a) $9a^3 + 27b^2$

$= 9\left(\frac{9a^3}{9} + \frac{27b^2}{9}\right)$
$= 9(a^3 + 3b^2)$

b) $24xy^2 - 12xy + 36x^2y$

$= 12xy\left(\frac{24xy^2}{12xy} - \frac{12xy}{12xy} + \frac{36x^2y}{12xy}\right)$
$= 12xy(2y - 1 + 3x)$

c) $xy + 12 + 4x + 3y$

$= xy + 3y + 4x + 12$
$= y(x+3) + 4(x+3)$
$= (x+3)(y+4)$

Answers

1)a) $5(3w + 5z)$ **b)** $c(17a - 8d)$ **c)** $6b^2(2b^2 + 3)$ **d)** not factorable
2)a) $2xy(7x + 8y^2)$ **b)** not factorable **c)** not factorable **d)** $9rs^2(3r - 2r^2 - 4s)$
3)a) $(x + 8)(3x + 5)$ **b)** $(b + 1)(a + 9c)$ **c)** not factorable
4)a) $(x + y)(m + 2)$ **b)** $(x + 3)(x + 2)$ **c)** $(y + 3)(ay + 4)$
5)a) $SA = 2\pi r(r + h)$ **b)** $SA = 66\pi$ cm², or 207.3 cm²
6)a) $9(a^3 + 3b^2)$ **b)** $12xy(2y - 1 + 3x)$ **c)** $(x + 3)(y + 4)$