MATH 7
HOMEWORK 3: RATIONALIZING THE DENOMINATOR

SEP 30, 2018

Algebraic Identities

$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$
$$a^2 - b^2 = (a-b)(a+b)$$

Scientific Notation

A number is written in standard form or scientific notation if it has the form $\mathbf{N \times 10^n}$, where $1 \leqslant N < 10$ and n is an integer. For example 0.00023 is 2.3×10^{-4} in scientific notation. (2.3 if correct to 2 significant figures, 2.30 if correct to 3 significant figures).

Homework

1. Rewrite in scientific notation: 52,000,000 (correct to 2 significant figures), 32,000 (correct to 3 significant figures)

2. Simplify:
(a) $\sqrt{\dfrac{56}{13}} \cdot \sqrt{\dfrac{26}{7}} =$
(b) $\sqrt{48} =$
(c) $\dfrac{\sqrt{48}}{\sqrt{15}} =$

3. Express the following expressions in the form $2^r 3^s a^m a^n$:
(a) $8a^3b^2(27a^3)(2^5ab) =$
(b) $3^2(2ab)^3(16a^2b^5)(24b^2a) =$
(c) $16a^2b^3(6ab^4)(ab^2)^3 =$

4. Write each of the following expressions in the form $a + b\sqrt{3}$, with rational a, b:

(a) $(1+\sqrt{3})^2$ (b) $(1+\sqrt{3})^3$
(c) $\dfrac{1}{1-2\sqrt{3}}$ (d) $\dfrac{1+\sqrt{3}}{1-\sqrt{3}}$ (e) $\dfrac{1+2\sqrt{3}}{\sqrt{3}}$

5. Solve the following equations.

(a) $(x^2-1)(x+2) = 0$ (b) $\dfrac{x+2}{x+3} = 2$ (c) $5(x+1) = 3x+2$
(d) $(x-3)(x+4) = 0$

6. Prove:
(a) $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
(b) $(a-b)^3 = a^3 - 3a^2b + 2ab^2 - b^3$

(c) Find $(a+b)^4$, $(a-b)^4$ using the previous results.

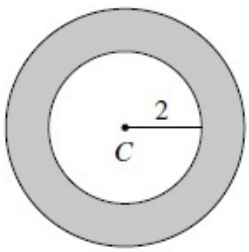
7. Expand as sums of powers of x:
(a) $(2x+5)^2 =$
(b) $(2-4x)^2 =$
(c) $(1-2x)^2 =$
(d) $(1-x)^2(2-x) =$
(e) $(2x+1)^2(2-3x) =$

8. The population of a city was $20,000$ in 1910, and it doubles every 10 years. What was the population in 1950? What will be the population in 2020?

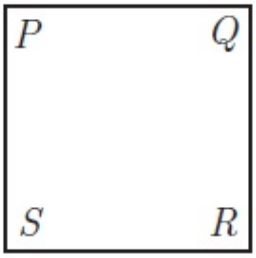
9. If a is even, show that a^2 is even, and if a is odd, show that a^2 is odd. (Hint: If a is even, it can be written as $a = 2n$, if it is odd then it can be written as $a = 2n+1$).

10. Amanda has an average of 92 on her seven tests. What should she get on her $8th$ test to have an average of 93?

11. The shaded area is 11π. What is the radius of the larger circle?



12. PQRS is a square piece of paper. P is folded onto R and then Q is folded onto S. The area of the resulting figure is 9 square inches. Find the perimeter of square PQRS.



13. A $4 \times 4 \times 4$ cubical box has 64 small cubes inside. How many of these touch a side or the bottom of the box?