CAT Homework Pre-Req-1 Radical & Exponential Expressions

- Use your calculator when appropriate and be sure you know how to get exact answers when you use it.
- EXACT ANSWERS: reduced integers or improper fractions (no decimal approximations)

Simplify the following expressions. Answers should be in exact form, when possible.

1. $\dfrac{6^2-4^2-2^2}{-2(4)(2)}$

$\dfrac{36-16-4}{-16} = \dfrac{16}{-16} = \boxed{-1}$

2. $\sqrt{(1-3)^2+(5-2)^2}$

$\sqrt{(-2)^2+(3)^2} = \sqrt{4+9}$

$= \boxed{\sqrt{13}}$

3. $\left(\dfrac{2}{3}\right)^{10}$ $\dfrac{2^{10}}{3^{10}}$

$\boxed{\dfrac{1024}{59049}}$

4. $\dfrac{2\left(1-\left(\frac{1}{2}\right)^8\right)}{1-\frac{1}{2}}$ $\dfrac{2\left(1-\left(\frac{1}{256}\right)\right)}{\frac{1}{2}}$

$\boxed{\dfrac{255}{64}}$

5. $2\sqrt{3240}$

$4 \cdot 810$

$4 \cdot 81 \cdot 10$

$2\sqrt{4}\cdot\sqrt{81}\cdot\sqrt{10}$

$2 \cdot 2 \cdot 9\sqrt{10} = \boxed{36\sqrt{10}}$

6. $\dfrac{2}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \boxed{\dfrac{2\sqrt{3}}{3}}$

7. $\dfrac{6}{5\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{6\sqrt{3}}{15}$

$= \boxed{\dfrac{2\sqrt{3}}{5}}$

8. $\dfrac{5}{2-\sqrt{7}} \cdot \dfrac{2+\sqrt{7}}{2+\sqrt{7}}$

$\dfrac{5(2+\sqrt{7})}{4-7} = \dfrac{10+5\sqrt{7}}{-3}$

or $-\dfrac{10}{3} - \dfrac{5\sqrt{7}}{3}$

9. $\dfrac{1-\frac{7}{6}}{\frac{1}{20}+5}$ $\dfrac{100}{20}$

$\dfrac{-\frac{1}{6}}{\frac{101}{20}} \cdot \dfrac{20}{101}$

$\boxed{\dfrac{-10}{303}}$

10. $\sqrt{\dfrac{2+\frac{\sqrt{3}}{2}}{2}} \cdot \dfrac{2}{2} = \sqrt{\dfrac{4+\sqrt{3}}{4}}$

$\boxed{\dfrac{\sqrt{4+\sqrt{3}}}{2}}$

11. $9^{\frac{3}{2}}$

$\left(\sqrt[2]{9}\right)^3 = 3^3 = \boxed{27}$

12. $8^{\frac{5}{3}}$

$\left(\sqrt[3]{8}\right)^5 = 2^5 = \boxed{32}$

CAT Homework Pre-Req-1 Radical & Exponential Expressions

13. $\frac{x^4 y^3}{x^2 y^5}$

$\frac{x^2}{y^2}$

14. $\frac{(3x^2)y^4}{3y^2}$

$x^2 y^2$

15. $\left(\frac{5}{x^3}\right)^2$

$\frac{25}{x^6}$

16. $\left(\frac{4}{xy}\right)^{-3}$

$\left(\frac{xy}{4}\right)^3 = \frac{x^3 y^3}{64}$

17. $\frac{(x^{-3}y^3)^{-5}}{(y^4 x^{-3})^{-2}}$

$\frac{x^{15}y^{-15}}{x^6 y^{-8}} = \frac{x^9 y^8}{y^{15}}$

$\frac{x^9}{y^7}$

18. $\left(\frac{4x^3y^2}{x^3y^2}\right)\left(\frac{3y^2}{2x^2y^4}\right)$

$\frac{12x^3y^4}{2x^5y^6} = \frac{6}{x^2y^2}$

19. $2^2 \cdot 2^n$

2^{2+n}

20. $4 \cdot 2^{n-1}$

$2^2 \cdot 2^{n-1} = 2^{2+n-1}$

$= 2^{n+1}$

21. $20\sqrt{3} - 5\sqrt{27}$

$20\sqrt{3} - 5 \cdot \sqrt{9} \cdot \sqrt{3}$

$20\sqrt{3} - 15\sqrt{3}$

$5\sqrt{3}$

22. $(-5\sqrt{12}) \cdot (-3\sqrt{3})$

$15\sqrt{36}$

$15 \cdot 6$

90

23. $16^{\frac{1}{4}} \cdot 4^{\frac{1}{2}}$

$\sqrt[4]{16} \cdot \sqrt[2]{4}$

$2 \cdot 2 = 4$

24. $\frac{6}{\sqrt[3]{2}} \cdot \frac{\sqrt[3]{2 \cdot 2}}{\sqrt[3]{2 \cdot 2}}$

$\frac{6\sqrt[3]{4}}{2} = 3\sqrt[3]{4}$