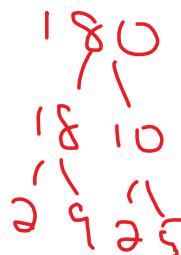


10 Part I: Multiple Choice. Place the correct answer in the corresponding blank at the end of this section.

1. What is 180 as a product of prime factors?

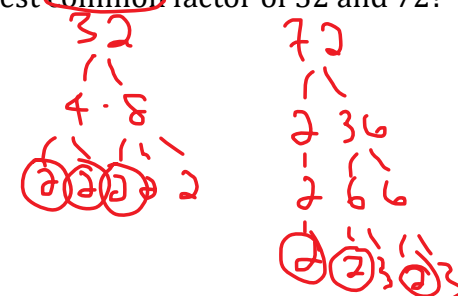
- (A) $10 \cdot 18$
- (B) $2 \cdot 2 \cdot 5 \cdot 9$
- (C) $2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$
- (D) $2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 5$



$2 \cdot 3 \cdot 3 \cdot 2 \cdot 5$
 $2 \cdot 2 \cdot 3 \cdot 3 \cdot 5$

2. What is the greatest common factor of 32 and 72?

- (A) 2
- (B) 4
- (C) 8
- (D) 16



$2 \cdot 2 \cdot 2 = 8$

3. What is the least common multiple of 12 and 14?

- (A) 2
- (B) 24
- (C) 84
- (D) 168



LCM: $2 \cdot 2 \cdot 3 \cdot 7 = 84$

4. Determine the edge length of a cube with volume of 64 m^3 .

- (A) 2 m
- (B) 4 m
- (C) 8 m
- (D) 32 m

$\sqrt[3]{64} = 4$

5. Evaluate: $\sqrt[3]{-125}$

(A) -11.2

(B) -5

(C) 5

(D) 11.2

6. Which of the following is irrational? $\sqrt{\frac{36}{81}}$, $\sqrt[3]{-27}$, $\sqrt{24}$, $\sqrt{25}$

(A) $\sqrt[3]{27}$

(B) $\sqrt{\frac{36}{81}}$

(C) $\sqrt{24}$

(D) $\sqrt{25}$

$\frac{6}{9}$ -3 5

7. What is $2\sqrt[3]{3}$ written as an entire radical?

(A) $\sqrt[3]{6}$

(B) $\sqrt[3]{12}$

(C) $\sqrt[3]{18}$

(D) $\sqrt[3]{24}$

$= \sqrt[3]{2^3} \sqrt[3]{3} \rightarrow \sqrt[3]{24}$
 $= \sqrt[3]{8} \sqrt[3]{3}$

8. What is $\sqrt{108}$ as a reduced, mixed radical?

(A) $3\sqrt{6}$

(B) $6\sqrt{3}$

(C) $3\sqrt{36}$

(D) $36\sqrt{3}$

$= \sqrt{36} \sqrt{3}$ or $6\sqrt{3}$

$108 \sqrt{2 \cdot 2 \cdot 3 \cdot 3 \cdot 3}$
 $36 \cdot 3$
 $6 \cdot 6 \cdot 3$
 $2 \cdot 3 \cdot 2 \cdot 3 \cdot 3$

9. What is $\left(\frac{2}{5}\right)^{\frac{3}{4}}$ written as a radical?

- (A) $\sqrt[4]{\left(\frac{2}{5}\right)^3}$ $\left(\frac{2}{5}\right)^{3 \cdot \frac{1}{4}}$
 (B) $\sqrt[3]{\left(\frac{2}{5}\right)^4}$ $\sqrt[4]{\left(\frac{2}{5}\right)^3}$
 (C) $\sqrt[5]{\left(\frac{3}{4}\right)^2}$
 (D) $\sqrt{\left(\frac{3}{4}\right)^5}$

10. Simplify $\frac{18x^3y^2}{6x^4y^1}$ = $3x^{3-4}y^{2-1}$

- (A) $\frac{3y}{x}$ = $3x^{-1}y$
 (B) $3xy$
 (C) $\frac{12y}{x}$ = $\frac{3 \cdot 1}{x}$
 (D) $12xy$

Answers to multiple choice.

1. ___ 2. ___ 3. ___ 4. ___ 5. ___
 6. ___ 7. ___ 8. ___ 9. ___ 10. ___

20 **Part II: Constructed Response. Answer each question in the space provided. Show all workings.**

4 11. Determine the greatest common factor of 120 and 180.

Handwritten prime factorization for 120: 120 → 12 · 10 → (2) · (2) · (3) · (2) · (5) → 2 · (2) · (3) · (2) · (5)

Handwritten prime factorization for 180: 180 → 18 · 10 → (2) · (3) · (3) · (2) · (5) → (2) · (3) · (3) · (2) · (5)

Handwritten result: $2 \cdot 2 \cdot 3 \cdot 5 = 60$

- 4 12. Elijah has voice lessons every 8 days. Jonas has piano lessons every 14 days. If they both have lessons today, how many days will pass before they have lessons on the same day again?

$$\begin{array}{r}
 8 \quad 16 \quad 24 \quad 32 \quad 40 \quad 48 \quad (56) \\
 14 \quad 28 \quad 42 \quad (56) \\
 \hline
 \begin{array}{cc}
 8 & 14 \\
 \begin{array}{c} \diagup \diagdown \\ 2 \quad 2 \quad 2 \end{array} & \begin{array}{c} \diagup \diagdown \\ 2 \quad 7 \end{array}
 \end{array}
 \end{array}$$

$2 \cdot 2 \cdot 2 \cdot 7 = 56$

- 4 13. Simplify: $\frac{(x^{-3}y^6)(x^4y^6)}{(x^6y^4)^{-2}}$. Write using powers with positive exponents.

$$\begin{aligned}
 &= \frac{x^{-3} \cdot x^4 \cdot y^6 \cdot y^6}{x^{6(-2)} \cdot y^{4(-2)}} \\
 &= \frac{x^{-3+4} \cdot y^{6+6}}{x^{-12} \cdot y^{-8}} \\
 &= \frac{x^1 \cdot y^{12}}{x^{-12} \cdot y^{-8}} \\
 &= x^{1-(-12)} \cdot y^{12-(-8)} \\
 &= x^{13} \cdot y^{20}
 \end{aligned}$$

- 4 14. Evaluate:

(A) $32^{\frac{2}{5}}$

$$\begin{aligned}
 &= 32^{\frac{1}{5} \cdot 2} \\
 &= (\sqrt[5]{32})^2 \\
 &= 2^2 = 4
 \end{aligned}$$

(B) $\left(\frac{25}{49}\right)^{\frac{1}{2}}$

$$\begin{aligned}
 &= \left(\frac{49}{25}\right)^{\frac{1}{2}} \\
 &= \sqrt{\frac{49}{25}} \\
 &= \frac{\sqrt{49}}{\sqrt{25}} \\
 &= \frac{7}{5}
 \end{aligned}$$

4

15. Julie completed a math problem and made a mistake. In which step does the first error occur? Rewrite Julie's solution so that it is correct.

The error occurs in step

2

$$\frac{(4a^{-3}b^4)^{-2}}{a^6b^{-1}}$$

Correct solution:

$$\begin{aligned}
 &= \frac{4^{-2} a^6 b^{-8}}{a^6 b^{-1}} \\
 &= \frac{4^2}{b^{-8 - (-1)}} \\
 &= \frac{16}{b^{-7}} \\
 &= \frac{1}{16b^7}
 \end{aligned}$$

$$\begin{aligned}
 \text{Step 1} &= \frac{4^{-2} a^6 b^{-8}}{a^6 b^{-1}} \quad -8 - (-1) \\
 &= \frac{a^0 b^{-9}}{4^2} \quad = -7 \\
 \text{Step 2} &= \frac{1}{16b^9} \\
 \text{Step 3} &= \frac{1}{16b^9}
 \end{aligned}$$