




Foundations of Mathematics and Pre-Calculus 10

Sample Questions for Algebra and Number

Instructions

1. You may require a protractor and a ruler (metric and imperial) for paper versions of the questions.
2. You may use math tiles.
3. When using your calculator (scientific or approved graphing calculator):
 - use the programmed value of π rather than the approximation of 3.14.
 - round only in the final step of the solution.
4. Diagrams are not necessarily drawn to scale.
5. For questions marked with , do not use your calculator.

PART A: MULTIPLE-CHOICE QUESTIONS



1. Which of the following powers is a perfect cube?

- A. 3^2
- B. 5^6
- C. 6^4
- D. 9^2



2. Write as a single power: $\frac{12^3}{4^3}$

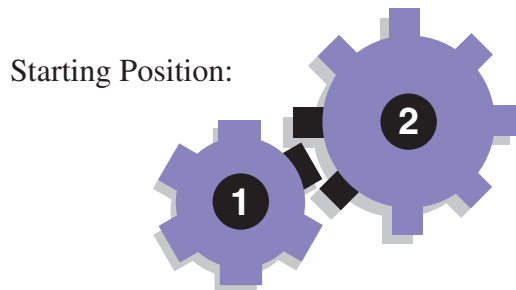
- A. 3^0
- B. 3^3
- C. 8^3
- D. 48^6

3. Given $x > 1$, arrange from the least to the greatest:

$$\sqrt{x}, \frac{1}{\sqrt[3]{x}}, \sqrt[3]{x^2}$$

- A. $\frac{1}{\sqrt[3]{x}}, \sqrt{x}, \sqrt[3]{x^2}$
- B. $\frac{1}{\sqrt[3]{x}}, \sqrt[3]{x^2}, \sqrt{x}$
- C. $\sqrt{x}, \sqrt[3]{x^2}, \frac{1}{\sqrt[3]{x}}$
- D. $\sqrt[3]{x^2}, \frac{1}{\sqrt[3]{x}}, \sqrt{x}$

4. Two gears are shown below in their starting position.
- Gear 1 has 6 teeth.
 - Gear 2 has 8 teeth.
 - As Gear 1 turns, it causes Gear 2 to turn at a different rate.
 - Gear 1 is rotated until the two gears are back to this starting position.



What is the minimum number of rotations Gear 1 requires to return to this starting position?

- A. 48 rotations
- B. 24 rotations
- C. 4 rotations
- D. 2 rotations

5. Three students were asked to show steps for simplifying $\sqrt[3]{1080}$ to $6\sqrt[3]{5}$.

Jean	Sally	Mark
$\begin{aligned}\sqrt[3]{1080} &= \sqrt[3]{2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5} \\ &= (2 + 3)(\sqrt[3]{5}) \\ &= 6\sqrt[3]{5}\end{aligned}$	$\begin{aligned}\sqrt[3]{1080} &= \sqrt[3]{216 \times 5} \\ \sqrt[3]{216} &= 6 \\ \therefore \sqrt[3]{1080} &= 6\sqrt[3]{5}\end{aligned}$	$\begin{aligned}\sqrt[3]{1080} &= \sqrt[3]{27 \times 5 \times 8} \\ &= 3 \times \sqrt[3]{5} \times 2 \\ &= 6\sqrt[3]{5}\end{aligned}$

Which student made a mistake, if any?

- A. Jean
- B. Sally
- C. Mark
- D. All of them show correct work.

6. Simplify: $\left(\frac{-54x^6y}{2x^{-3}y^4}\right)^{\frac{4}{3}}$

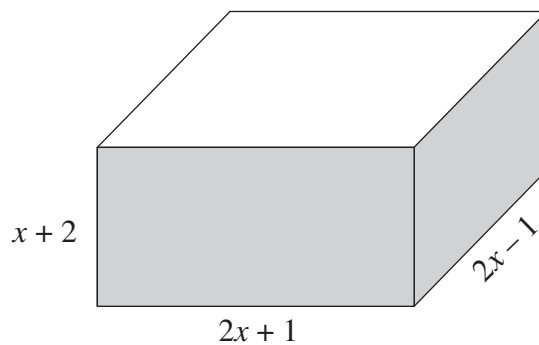
A. $-36x^4y^4$

B. $-\frac{36x^{12}}{y^4}$

C. $81x^4y^4$

D. $\frac{81x^{12}}{y^4}$

7. Determine a simplified expression for the lateral surface area of the prism below.



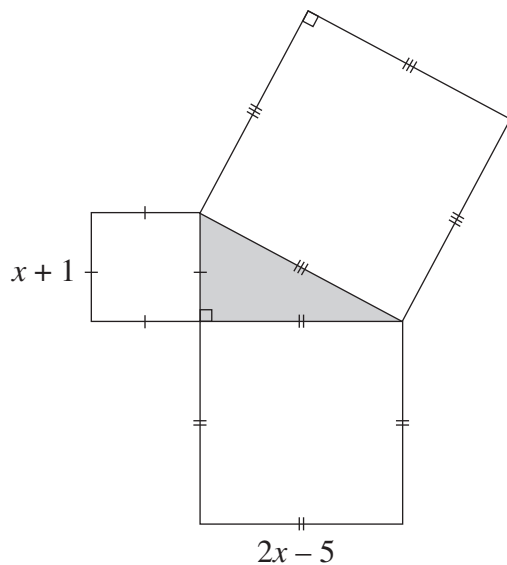
A. $8x^2 + 16x$

B. $8x^2 + 20x + 8$

C. $16x^2 + 16x - 2$

D. $4x^3 + 8x^2 - x - 2$

8. Determine an expression for the area of the largest square in the diagram below.



- A. $4x^2 + 25$
- B. $4x^2 - 20x + 25$
- C. $5x^2 + 26$
- D. $5x^2 - 18x + 26$

9. Derek expanded and simplified $(x - 3)(2x^2 + 5x - 8)$ as shown below.

	x	-3		
$2x^2$	$2x^3$	$-6x^2$		Step I
$+ 5x$	$5x^2$	$-15x$		Step II
$- 8$	$-8x$	-24		Step III
$= 2x^3 - x^2 - 23x - 24$				Step IV

In which step is Derek's first mistake?

- A. Step I
- B. Step II
- C. Step III
- D. Step IV

10. When $5x^2 - 20$ is factored, how many factors are in the result?

- A. 2
- B. 3
- C. 4
- D. 5

11. One of the factors of $(3x^2 - 16x + k)$ is $(x - 7)$. Determine the value of k .

- A. -35
- B. -9
- C. 5
- D. 63

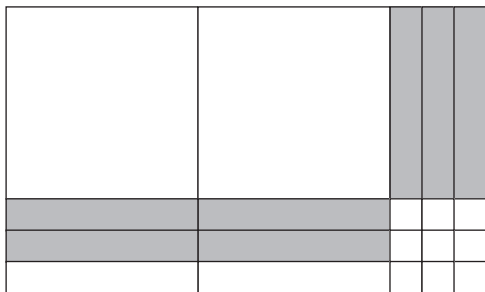
12. When factoring $x^2 - 7x + 6$ to the form $(x + a)(x + b)$, which two of the following characteristics are true?

I.	$ab = -7$ $a + b = 6$
II.	$ab = 6$ $a + b = -7$
III.	$a > 0$ and $b > 0$
IV.	$a < 0$ and $b < 0$
V.	$a > 0, b < 0$ or $a < 0, b > 0$

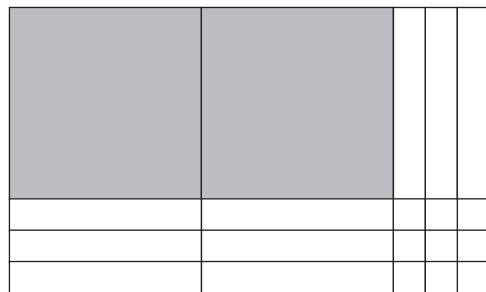
- A. I and III
- B. I and IV
- C. II and IV
- D. II and V

13. Which of the following areas formed by math tiles is factorable?

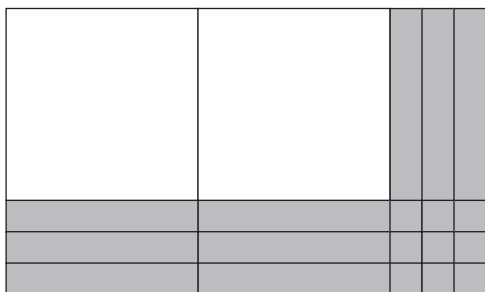
A.



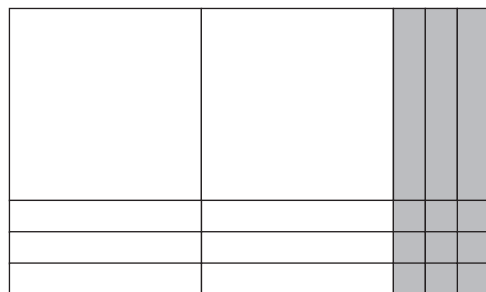
B.



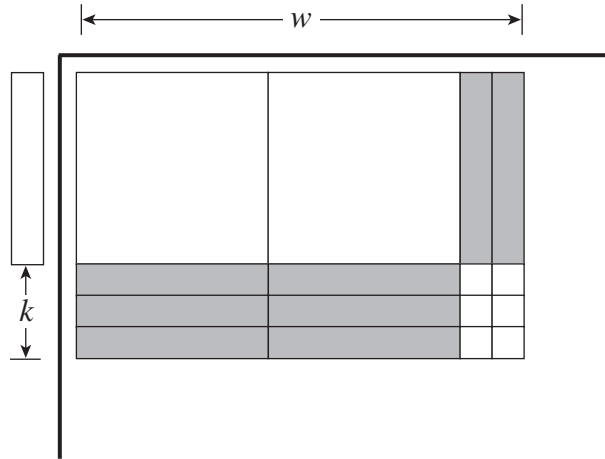
C.

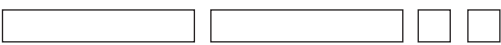
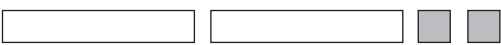




D.



14. Determine the missing tiles, labelled w , in the tile model below.



- A. 
- B. 
- C. 
- D. 

PART B: NUMERIC-RESPONSE QUESTIONS

15. Given $\sqrt[n]{x^{10}} = x^2$, determine the value of n . Answer to the nearest integer.

Record your answer neatly on the Answer Sheet.

16. When $(\sqrt[4]{7^9})(\sqrt[5]{7^3})$ is simplified to 7^n , determine the value of n . Answer to two decimal places.

Record your answer neatly on the Answer Sheet.