

Students should be able to solve **at least 8 out of 10 problems within two attempts** on the following pages to demonstrate readiness for the MC30 level. This exam evaluates proficiency in the following key areas:

## Algebra

### 1. Variables, Equations

- Solving linear equations with one variable
- Formulating a word problem using a linear equation
- Solving linear equations with two unknowns
- Solving quadratic equations via factoring, completing the square, and the quadratic formula
- Solving equations with radicals and exponents in one variable

## Geometry

### 1. Angles

- Basic angle properties involving lines and triangles

### 2. Area and Perimeter

- Area of rectangles, squares, triangles, circles
- Perimeter of a polygon, circumference of a circle

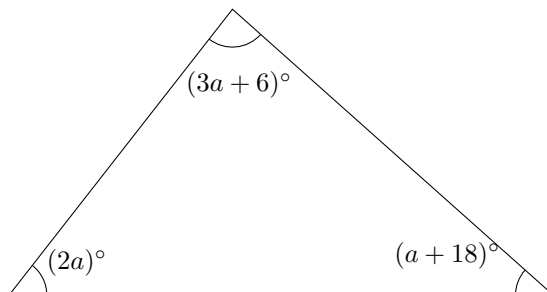
### 3. Coordinate Plane

- Identifying quadrants, plotting points in the coordinate plane
- Sketching linear equations (e.g.,  $y = 3x - 2$ ) in the coordinate plane

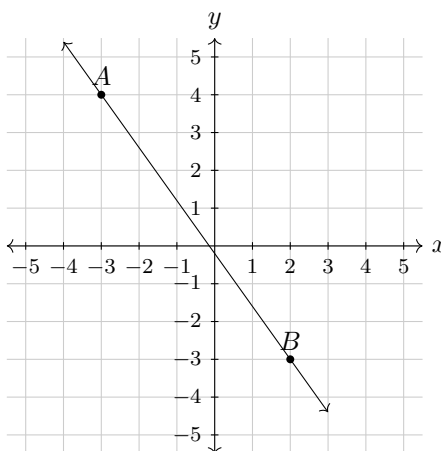
## Counting & Number Theory

1. Applying the addition and multiplication principles
2. Prime factorization, determining if a positive integer is prime or composite
3. Finding GCD, LCM of two numbers
4. Finding the units digit of arithmetic expressions

1. A water utility company charges a \$22 monthly service fee, plus \$3.50 per 1,000 gallons consumed. If Stanley paid \$53.50 in June, how many gallons of water did he consume that month?
2. What is the least common multiple of 240 and 700?
3. What is the value of  $a$  in the figure below?



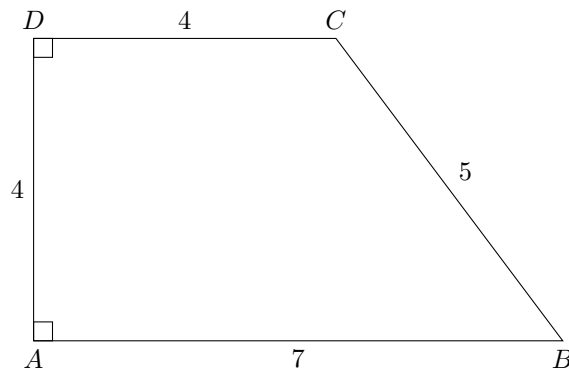
4. What value of  $y$  satisfies the equation  $\sqrt{20 - 4y} = 2 - y$ ?
5. Taylor has five t-shirts, four polo shirts, three pairs of pants, and two pairs of shoes. How many ways can Taylor choose one shirt, one pair of pants, and one pair of shoes to wear today?
6. The equation of the line passing through the points  $A(-3, 4)$  and  $B(2, -3)$  is  $y = mx + b$ , where  $m$  and  $b$  are constants. What is the value of  $b$ ? Express your answer as a common fraction in simplest form.



7. What is the units digit of  $(523^2 + 7) \times 39$ ?
8. Real numbers  $x$  and  $y$  satisfy the system of equations below. What is the value of  $x + y$ ?  
Express your answer as a common fraction in simplest form.

$$\begin{cases} 2x - y = 7 \\ x + 2y = -2 \end{cases}$$

9. What is the area of trapezoid  $ABCD$ , shown below?



10. The equation  $8x^2 = 6x + 9$  has two solutions for  $x$ . What is the larger of these two solutions?  
Express your answer as a common fraction in simplest form.