

QUESTION CATALOGUE

# Math B

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**I. ALGEBRA****A. Numbers, Sets, Systems, and Operations**

4668. A room is in the shape of a triangle. Its base is

$\frac{x-3}{x+3}$  and its height is  $\frac{x+3}{2x}$ . What is the area

of the room?

$$\frac{x-3}{4x}$$

4666.

A rectangular garden with an area of  $\frac{x^2-4}{x+3}$

has a width of  $\frac{x+2}{x+3}$ . What is the length of the

garden?

$$x-2$$

4613. What is the area of an imaginary circle of radius  $1-5i$ ?

- (1)  $(-24-5i)\pi$  (3)  $(26+5i)\pi$   
 (2)  $(-24-10i)\pi$  (4)  $(26+10i)\pi$

4612. What is the area of an imaginary triangle with a height of 2 and base of  $2+4i$ ?

- (1)  $2+4i$  (3)  $4+8i$   
 (2)  $4+6i$  (4)  $8$

4610. What is the area of an imaginary rectangle with sides of  $2+2i$  and  $3i$ ?

- (1)  $6+6i$  (3)  $6-6i$   
 (2)  $-6-6i$  (4)  $-6+6i$

4581. What is the product of  $5+\sqrt{-36}$  and  $1-\sqrt{-49}$ , expressed in simplest  $a+bi$  form?

- (1)  $-37+41i$  (3)  $47+41i$   
 (2)  $5-71i$  (4)  $47-29i$

4539. The relationship between voltage,  $E$ , current,  $I$ , and resistance,  $Z$ , is given by the equation  $E=IZ$ . If a circuit has a current  $I=3+2i$  and a resistance  $Z=2-i$ , what is the voltage of this circuit?

- (1)  $8+i$  (3)  $4+i$   
 (2)  $8+7i$  (4)  $4-i$

4526. In an electrical circuit, the voltage,  $E$ , in volts, the current,  $I$ , in amps, and the opposition to the flow of current, called impedance,  $Z$ , in ohms, are related by the equation  $E=IZ$ . A circuit has a current of  $(3+i)$  amps and an impedance of  $(-2+i)$  ohms. Determine the voltage in  $a+bi$  form.

$$-7+i$$

4502. The relationship of distance,  $D$ , rate,  $r$ , and time,  $t$ , is given by the equation  $D=rt$ . If the rate =  $4-3i$  and the time =  $5+2i$ , what is the Distance?

$$26-7i$$

**3. Complex Numbers**  
**c. Mult & Div of Complex Numbers**

4154. What is the reciprocal of  $3-\sqrt{5}$ ?

- (1)  $\frac{3-\sqrt{5}}{4}$  (3)  $\frac{3-\sqrt{5}}{14}$   
 (2)  $\frac{3+\sqrt{5}}{4}$  (4)  $\frac{3+\sqrt{5}}{14}$

3887. The expression  $(-1+i)^3$  is equivalent to

- (1)  $-3i$  (3)  $-1-i$   
 (2)  $-2-2i$  (4)  $2+2i$

3675. Where  $i$  is the imaginary unit, expand and simplify completely  $(3-i)^4$ .

$$28-96i$$

2486. The value of  $(1-i)^2$  is

- (1)  $0$  (3)  $-2i$   
 (2)  $2$  (4)  $2-2i$

2345. Express the product of  $4-3i$  and  $2+i$  in simplest  $a+bi$  form.

$$11-2i$$

2311. The product of  $5-2i$  and  $i$  is

- (1)  $7$  (3)  $5-2i$   
 (2)  $2+5i$  (4)  $-2+5i$

2265. Expressed in  $a+bi$  form,  $\frac{5}{3+i}$  is equivalent to

- (1)  $\frac{15-5i}{8}$  (3)  $\frac{3-1i}{2}$   
 (2)  $\frac{5-5i}{3}$  (4)  $15-5i$

2163. Express  $\frac{5}{2-i}$  in simplest  $a+bi$  form.

$$2+i$$

2089. The expression  $(3-i)^2$  is equivalent to

- (1)  $8$  (3)  $10$   
 (2)  $8-6i$  (4)  $8+6i$

2052. The expression  $\frac{\sqrt{3}+1}{\sqrt{3}-1}$  is equal to

- (1)  $-1$  (3)  $2+\sqrt{3}$   
 (2)  $2$  (4)  $5+\sqrt{3}$

1955. The expression  $\frac{1}{5+2i}$  is equivalent to

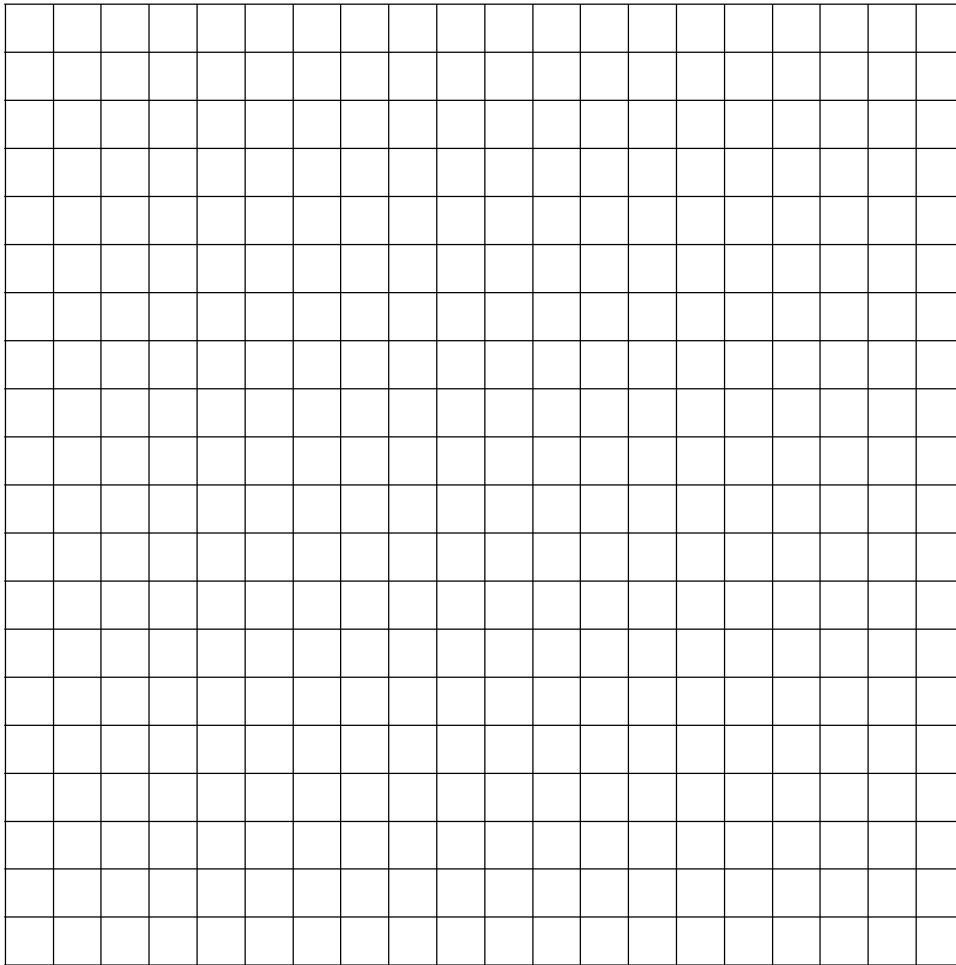
- (1)  $\frac{5+2i}{21}$  (3)  $\frac{5-2i}{21}$   
 (2)  $\frac{5+2i}{29}$  (4)  $\frac{5-2i}{29}$



3900.

*a* On the accompanying grid, graph the equation  $2y = 2x^2 - 4$  in the interval  $-3 \leq x \leq 3$  and label it *a*.

*b* On the same grid, sketch the image of *a* under  $T_{5,-2} \circ r_{x\text{-axis}}$  and label it *b*.



graph

4422. Given the equations:

*a*:  $y = x^2$

*b*:  $y = -(x + 5)^2 - 6$

Describe the composition of transformations performed on *a* to get *b*.

**A shift left of 5, a reflexion over the *x*-axis, and a shift down of 6 OR  $r_{x\text{-axis}}$  and then  $T_{(-5,-6)}$ .**

4138. A translation maps  $P(4,1)$  to  $P'(2,-1)$ . What are the coordinates of  $Q'$ , the image of  $Q(1,3)$  under the same translation?

**(-1,1)**

3508. A translation moves  $A(-1,3)$  to  $A'(-3,7)$ . What are the coordinates of  $B'$ , the image of  $B(5,-3)$  under the same translation?

**(3,1)**

4084. A translation maps  $(x, y)$  to  $(x - 5, y + 3)$ . In which quadrant does the point  $(-3,-2)$  lie under the same translation?

- (1) I
- (2) II
- (3) III
- (4) IV

3602. What is the image of point  $(2,4)$  under the translation  $T_{-6,1}$ ?

- (1)  $(-4,3)$
- (2)  **$(-4,5)$**
- (3)  $(8,3)$
- (4)  $(8,5)$

3468. If a translation maps  $A(-1,5)$  to  $A'(2,9)$ , what are the coordinates of  $B'$ , the image of  $B(2,-2)$  under the same translation?

**(5,2)**

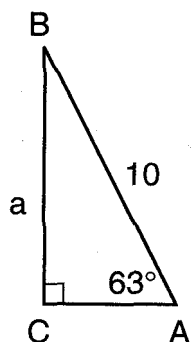
# IV. TRIGONOMETRY

## A. Trigonometry

# 1. Trigonometry of the Right Triangle

## a. Sin, Cos, & Tan Functions

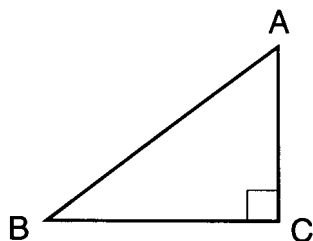
3325. In right triangle  $ABC$ ,  $m\angle C = 90^\circ$ ,  $m\angle A = 63^\circ$  and  $AB = 10$ . If  $BC$  is represented by  $a$ , then which equation can be used to find  $a$ ?



(1)  $\sin 63^\circ = \frac{a}{10}$                       (3)  $\tan 63^\circ = \frac{a}{10}$

(2)  $a = 10 \cos 63^\circ$                       (4)  $a = \tan 27^\circ$

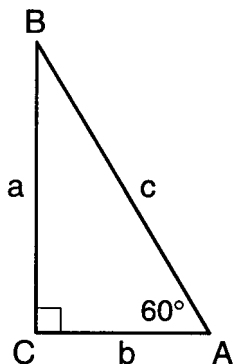
3274. In the accompanying diagram of right triangle  $ABC$ , the hypotenuse is  $\overline{AB}$ ,  $AC = 3$ ,  $BC = 4$ , and  $AB = 5$ .



Sin  $B$  is equal to

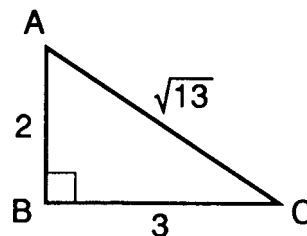
- (1)  $\sin A$                                       (3)  $\tan A$   
 (2)  $\cos A$                                       (4)  $\cos B$

3272. In the accompanying diagram of right triangle  $ABC$ ,  $b = 40$  centimeters,  $m\angle A = 60^\circ$ , and  $m\angle C = 90^\circ$ . Find the number of centimeters in the length of side  $c$ .



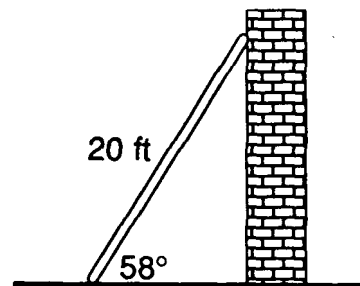
80 cm

3244. In the accompanying diagram of right triangle  $ABC$ , what is  $\tan C$ ?



- (1)  $\frac{2}{3}$     (3)  $\frac{3}{2}$   
 (2)  $\frac{\sqrt{13}}{3}$                                       (4)  $\frac{2}{\sqrt{13}}$

3240. A 20-foot ladder is leaning against a wall. The foot of the ladder makes an angle of  $58^\circ$  with the ground. Find, to the nearest foot, the vertical distance from the top of the ladder to the ground.



17

3229. The hypotenuse of right triangle  $ABC$  is 10 and  $m\angle A = 60^\circ$ . What is the measure, to the nearest tenth, of the leg opposite  $\angle A$ ?

- (1) 5.0    (3) 7.1  
 (2) 5.8    (4) 8.7

3213. If  $\cos x = 0.8$ , what is the value of  $\sin x$ ?

- (1) 1.0    (3) 0.6  
 (2) 0.2    (4) 0.4

3196. If  $\tan A = \frac{3}{4}$ , find  $m\angle A$  to the nearest degree.

37°

3177. If  $\sin A = 0.3642$ , find the measure of  $\angle A$  to the nearest degree.

21°

3119. If  $\tan A = 1.3000$ , find  $m\angle A$  to the nearest degree.

52°

3043. In rectangle  $ABCD$ ,  $AD = 10$ ,  $CD = 8$ , and diagonal  $\overline{AC}$  is drawn. Find, to the nearest degree,  $m\angle CAD$ .

39°