



Bachelor's Degree Programme: **Mechanical Engineering**

SAMPLE ENTRANCE EXAM QUESTIONS IN MATHEMATICS

Update: February 2025

Thematic areas of the entrance examination:

- 1. Geometry** (calculating areas, volumes, lengths, trigonometry: trigonometric functions, using of Pythagorean theorem, using of the cosine and sine theorems, algebraic geometry: e.g., equations of a straight line, parabola, circle etc.)
- 2. Percents** (basic calculations with percentages)
- 3. Algebra** (linear equations, quadratic equations, systems of equations)
- 4. Fractions**
- 5. Direct proportion, arithmetic and geometric progression**

GEOMETRY

Example 1

(1 point)

The base of a triangle is 4 times as long as its height. If together they measure 95 cm, what is the area of the triangle?

- 380 cm²
- 95 cm²
- 100 cm²
- 180.5 cm²
- 1,444 cm²
- 722 cm²

Example 2

(1 point)

The width of a rectangle is 20 cm. The diagonal is 8 cm longer than the length. Find the length of the rectangle.

- a. 20 cm
- b. 22 cm
- c. 20.5 cm
- d. 18 cm
- e. 21 cm
- f. 23 cm

Example 3

(1 point)

What is the radius of the circle with the equation $(x - 5)^2 + (y + 2)^2 = 81$?

- a. 4
- b. 5
- c. 9
- d. 81

Example 4

(2 points)

Find the measure of each angle of a regular 15-sided polygon to the nearest tenth of a degree.

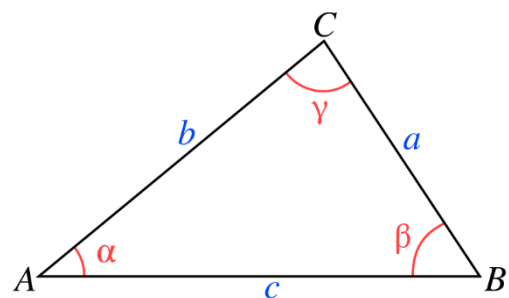
- a. 150°
- b. 128.6°
- c. 12°
- d. 60°
- e. 156°
- f. 24°

Example 5

(2 points)

In triangle ABC is $c = 42$ in, $a = 37$ in and $b = 26$ in. Solve this triangle: angle α , β and γ .

- a. $\alpha = 80.83^\circ$, $\beta = 47.76^\circ$, $\gamma = 71.31^\circ$
- b. $\alpha = 60.63^\circ$, $\beta = 33.76^\circ$, $\gamma = 81.61^\circ$
- c. $\alpha = 60.63^\circ$, $\beta = 37.76^\circ$, $\gamma = 81.61^\circ$
- d. $\alpha = 50.83^\circ$, $\beta = 37.76^\circ$, $\gamma = 81.61^\circ$
- e. $\alpha = 60.63^\circ$, $\beta = 37.76^\circ$, $\gamma = 51.32^\circ$
- f. $\alpha = 60.63^\circ$, $\beta = 47.76^\circ$, $\gamma = 87.23^\circ$

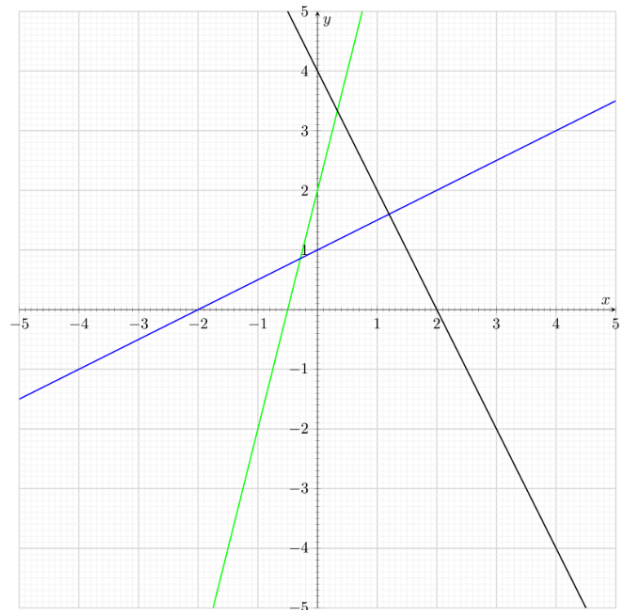


Example 6

(2 points)

Select the equation of the blue, green and black straight lines.

- a. $y = -x/2 + 1$
- b. $y = x/2 + 1$
- c. $y = -2x + 2$
- d. $y = 2x - 2$
- e. $y = 4x + 2$
- f. $y = -2x + 4$
- g. $y = -2x + 1$
- h. $y = 2x + 4$

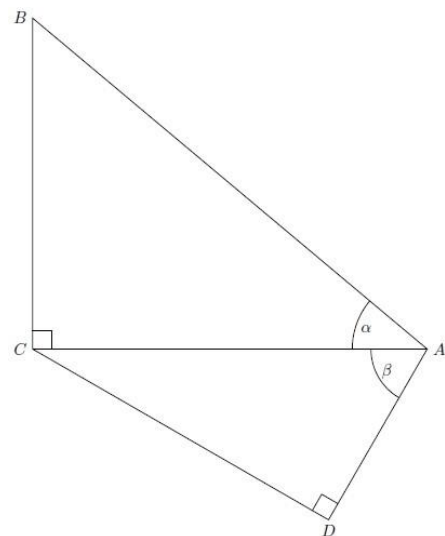


Example 7

(2 points)

Given $|AB| = 50$ in, $\alpha = 30^\circ$, $\beta = 45^\circ$, calculate $|CD|$ and round your answer to the nearest tenth.

- a. 30.6 in
- b. 50.0 in
- c. 35.4 in
- d. 17.7 in
- e. 43.3 in
- f. 17.2 in



PERCENTS

Example 8

(2 points)

Kim is a medical supplies salesperson. Each month she receives a 5% commission on all her sales of medical supplies up to \$20,000 and 8.5% on her total sales over \$20,000. Her total commission for May was \$3,975. What were her sales for the month of May?

- a. \$79,500
- b. \$65,500
- c. \$75,000
- d. \$35,000
- e. \$55,000

f. \$60,500

ALGEBRA

Example 9

(1 point)

Solve the system of equations:

$$3(x - 2) + 2y = x + y$$

$$4x + 5(y + x) = 3x - 6$$

- a. $x = 12; y = -9$
- b. $x = -12; y = 9$
- c. $x = 9; y = 12$
- d. $x = 9; y = -12$
- e. $x = -9; y = -12$
- f. $x = -9; y = 12$

Example 10

(1 point)

Solve the equation:

$$x^2 - 7x - 30 = 0$$

- a. $x_1 = 3; x_2 = 10$
- b. $x_1 = -3; x_2 = 10$
- c. $x_1 = -4; x_2 = 10$
- d. $x_1 = 4; x_2 = 10$

Example 11

(1 point)

Solve the inequation:

$$x^2 - x - 12 < 0$$

- a. $x \in (-4, 3)$
- b. $x \in (-3, 4)$
- c. $x \in (3, -4)$
- d. $x \in (3, 4)$

Example 12

(2 points)

How many gallons of pure sulfuric acid must be mixed with three gallons of a solution that is 25% sulfuric acid to make a solution that is 60% sulfuric acid?

- a. 3.750 gallons
- b. 3.625 gallons

- c. 4.750 gallons
- d. 4.625 gallons
- e. 2.625 gallons
- f. 5.625 gallons

Example 13

(2 points)

A garden in the shape of a rectangle is surrounded by a walkway of uniform width. The dimensions of the garden only are 35 feet by 24 feet. The area of the garden and the walkway together is 1,530 square feet. What is the width of the walkway, in feet?

- a. 4
- b. 5
- c. 11
- d. 24
- e. 29.5
- f. 34.5

Example 14

(2 points)

Doug went to a conference in a city 120 km away. On the way back, due to road construction, he had to drive 10 km/h slower, which resulted in the return trip taking 2 hours longer. How fast did he drive on the way to the conference?

- a. 10 km/h
- b. 20 km/h
- c. 30 km/h
- d. 40 km/h

FRACTIONS

Example 15

(1 point)

Joe walked $2\frac{3}{4}$ miles to school, $1\frac{1}{3}$ miles to the library, and $1\frac{2}{5}$ miles to his friend's house. How many miles did Joe walk altogether?

- a. $5\frac{3}{4}$
- b. $5\frac{29}{60}$
- c. $4\frac{3}{5}$
- d. $4\frac{11}{12}$
- e. $5\frac{16}{30}$
- f. $4\frac{1}{2}$

Example 16

(2 points)

One batch of scones will provide enough for $\frac{3}{11}$ of Beth's Sunday brunch gathering of 44 people. If she bakes five batches of scones, how many additional people could she feed?

- a. 8
- b. 11
- c. 15
- d. 16
- e. 20
- f. 60

Correct Answers:

1f; 2e; 3c; 4e; 5c;

6: blue -a, green -e, black -f;

7d; 8e; 9d;

10: $x_1 = -3$, $x_2 = 10$;

11: $x \in (-3, 4)$

12e; 13b; 14c; 15b; 16d

More examples and the opportunity to try the mock test await you in the e-learning, which will be made available to you after you have paid the application fee.