

ISEE Upper Level Mathematics Practice Test

47 questions | 40 minutes | Four choices per question

Directions. Work through this original mathematics section in the allotted time. Choose one answer for each question. Use scratch paper. Check the answer key only after finishing. This is independent practice, not an official ISEE test or a score predictor. The full ISEE also tests reading; Lower, Middle, and Upper have additional verbal, quantitative, and essay sections.

Name: _____

Date: _____

1. Solve $2(3x - 4) = 4x + 10$.

- A. 18 B. 1
C. 9 D. 7

2. Use the score summary shown. What is the sixth score?

Score summary
6 scores
Mean: 82
Five scores sum to 405

- A. 87 B. 82
C. 77 D. 492

3. Which quadratic expression has zeros -2 and 5 and an x^2 coefficient of 1?

- A. $x^2 - 3x - 10$ B. $x^2 + 3x - 10$
C. $x^2 - 7x + 10$ D. $x^2 + 3x + 10$

4. A game costs \$1 to play. Two of ten equally likely tokens pay a \$4 prize; the other tokens pay nothing. From the player's point of view, what is the expected profit or loss per play?

- A. \$0.80 B. -\$1.00
C. \$0.20 D. -\$0.20

5. For $f(x) = x^2 - 4x + 1$, which x-values give $f(x) = 1$?

- A. 4 only B. 2 only
C. 0 and 4 D. -4 and 0

6. Which value is equal to $(3 \times 10^4)(2 \times 10^{-2})$?

- A. 600 B. 60
C. 6000 D. 0.006

7. Solve the system $x + y = 13$ and $2x - y = 8$. What is y?

- A. 6 B. 7
C. 8 D. 5

8. The dice-sum table has 36 equally likely ordered outcomes. What is the probability that the sum is 7?

Dice sums equal to 7
(1,6) (2,5) (3,4)
(4,3) (5,2) (6,1)
Total outcomes: 36

- A. $7/36$ B. $1/3$
C. $1/6$ D. $1/12$

9. Which inequality is equivalent to $-3x + 4 < 16$?

- A. $x > 4$ B. $x > -4$
C. $x < -4$ D. $x < 4$

10. Use the population-change chart. A population of 800 increases by 10% and then decreases by 10%. What is the final population?

Population chart
Start: 800
Increase: 10%
Then decrease: 10%

- A. 720 B. 808
C. 792 D. 800

11. What is the slope of the line $2x + 3y = 12$?

- A. $2/3$ B. $-2/3$
C. 4 D. $-3/2$

12. The right triangle shown has legs 9 cm and 12 cm. What is its hypotenuse?

Right triangle
Legs: 9 cm and 12 cm
Hypotenuse: ?

- A. 18 cm B. 15 cm
C. $\sqrt{21}$ cm D. 21 cm

13. A line passes through (2, 5) and (6, 13). What is its equation?

- A. $y = 4x - 3$ B. $y = 2x - 1$
C. $y = 2x + 1$ D. $y = x + 3$

14. The table shows daily sales. What was the median daily sale?

Day	Mon	Tue	Wed	Thu	Fri
Sales (\$)	70	100	60	90	80

- A. \$85 B. \$90
C. \$75 D. \$80

15. For which x-value does $(x^2 - 9)/(x - 3)$ equal 0?

- A. no real value B. -3 only
C. -3 and 3 D. 3 only

16. The cylinder shown has radius 3 cm and height 10 cm. What is its volume?

Cylinder
Radius: 3 cm
Height: 10 cm
Volume: ?

- A. $300\pi \text{ cm}^3$ B. $60\pi \text{ cm}^3$
C. $30\pi \text{ cm}^3$ D. $90\pi \text{ cm}^3$

17. For $y = (x - 2)^2 - 7$, what is the minimum y-value?

- A. -7 B. -9
C. 2 D. 7

18. The club roster has 5 students. The club must choose 2 members for a committee. How many different committees are possible?

Club roster: A, B, C, D, E
Committee size: 2
Order does not matter

- A. 25 B. 10
C. 20 D. 5

19. The rectangle shown is enlarged so every side is 1.5 times as long. What is the new area?

Original rectangle
6 cm by 8 cm
Scale factor: 1.5

- A. 72 cm^2 B. 96 cm^2
C. 54 cm^2 D. 108 cm^2

20. If 5 raised to the power $(x + 1)$ equals 125, what is x?

- A. 24 B. 3
C. 2 D. 4

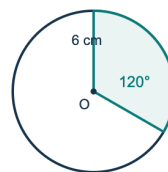
21. What is the value of $|-12| - |5 - 11|$?

- A. -6 B. 18
C. 6 D. 12

22. A rectangular box is 4 cm by 5 cm by 6 cm. What is its surface area?

- A. 120 cm^2 B. 148 cm^2
C. 74 cm^2 D. 96 cm^2

23. A circle has radius 6 cm. What is the area of a 120° sector?



- A. $9\pi \text{ cm}^2$ B. $36\pi \text{ cm}^2$
C. $24\pi \text{ cm}^2$ D. $12\pi \text{ cm}^2$

24. A survey asked 40 students to choose a sport. The table gives the counts. What percent chose soccer?

Sport	Students
Soccer	14
Basketball	18
Tennis	8

- A. 40% B. 65%
C. 35% D. 14%

25. Which number is irrational?

- A. $-7/3$ B. 0.125
C. $\sqrt{18}$ D. $\sqrt{16}$

26. A car travels 150 miles in 2.5 hours. At the same speed, how far will it travel in 4 hours?

- A. 240 miles B. 375 miles
C. 225 miles D. 60 miles

27. Use the printing bill shown. How many pages were printed?

Printing bill
Fixed fee: \$12
Page rate: \$0.08 each
Total bill: \$20

- A. 250 B. 100
C. 150 D. 8

28. The garden plan shows area 96 m² and length 12 m. How many meters of fencing surround it?

Garden plan
Area: 96 m²
Length: 12 m
Fence around edge

- A. 48 m B. 20 m
C. 96 m D. 40 m

29. Simplify $2x^2y - (3xy^2 - x^2y) + 4xy^2$.

- A. $3x^2y + xy^2$ B. $x^2y + xy^2$
C. $3x^2y + 7xy^2$ D. $3x^2y - xy^2$

30. What is $(2/3)^{-1} + 1/4$?

- A. $7/4$ B. $11/12$
C. $3/8$ D. $5/4$

31. What is the distance between (-1, 2) and (5, 10)?

- A. 14 B. 8
C. 10 D. $\sqrt{28}$

32. Use the token box shown. Two tokens are drawn without replacement. What is the probability both are white?

Token box
Black: 5
White: 3
Draw 2 without replacement

- A. $3/8$ B. $1/4$
C. $9/64$ D. $3/28$

33. A regular polygon has exterior angles of 45° each. How many sides does it have?

- A. 9 B. 8
C. 6 D. 12

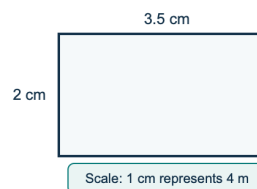
34. If $g(x) = 2x - 1$ and $h(x) = x^2$, what is $g(h(3))$?

- A. 17 B. 35
C. 5 D. 25

35. The data set is 2, 4, 4, 7, 13. If 13 is replaced by 23, how does the median change?

- A. It increases by 10.
B. It doubles.
C. It increases by 2.
D. It does not change.

36. On a plan, 1 cm represents 4 m. A rectangular room measures 3.5 cm by 2 cm on the plan. What is its actual floor area?



- A. 224 m² B. 112 m²
C. 28 m² D. 7 m²

37. The bar model shows a quantity changed to 0.4 of its original amount. By what percent did it decrease?

Original amount: 100%
New amount: 40%
Decrease: ?

- A. 4% B. 60%
C. 140% D. 40%

38. Triangle ABC has angles $A = 40^\circ$ and $B = 75^\circ$. An exterior angle at C is what measure?

- A. 105° B. 140°
C. 65° D. 115°

39. How many distinct real solutions does $x^2 - 6x + 9 = 0$ have?

- A. 1 B. 2
C. 3 D. 0

40. Simplify $\sqrt{72} - \sqrt{8}$.

- A. $4\sqrt{2}$ B. $\sqrt{64}$
C. $2\sqrt{2}$ D. $8\sqrt{2}$

41. A school wants to estimate the average commute time of all its students. Which sample is most likely to be representative?

- A. Only students who volunteer after school
B. Students chosen randomly from all grade levels
C. Only students who ride the bus
D. Only students in the first-period math class

42. A cone and a cylinder have the same base area and height. What is the ratio of cone volume to cylinder volume?

- A. 3:1 B. 1:3
C. 1:2 D. 2:3

43. The table follows a linear rule. What is the y-intercept of that rule?

Variable	First	Second	Third
x	2	4	6
y	2	8	14

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

44. If $a/b = 3/5$ and $b/c = 10/7$, what is a/c ?

- A. $13/12$ B. $3/10$
C. $3/7$ D. $6/7$

45. The midpoint of a segment is (3, -1). One endpoint is (8, 5). What is the other endpoint?

- A. (-5, -6) B. (5, 4)
C. (2, -3) D. (-2, -7)

46. A class has 12 students with mean score 80 and 8 students with mean score 90. What is the combined mean score?

- A. 170 B. 86
C. 84 D. 85

47. A tank contains 2.4 cubic meters of water. After one-fourth of it is drained, how many liters remain? ($1 \text{ m}^3 = 1,000 \text{ L}$)

- A. 2,400 L B. 18,000 L
C. 600 L D. 1,800 L

Answer key and explanations

1. **C — 9** $6x - 8 = 4x + 10$, so $2x = 18$ and $x = 9$.
2. **A — 87** All six sum to $6 \times 82 = 492$; subtract 405 to get 87.
3. **A — $x^2 - 3x - 10$** $(x + 2)(x - 5) = x^2 - 3x - 10$.
4. **D — \$0.20** Expected prize is $(2/10)(\$4) = \0.80 . Subtract the \$1 cost to get an expected loss of \$0.20, or -\$0.20.
5. **C — 0 and 4** Set $x^2 - 4x + 1 = 1$. Then $x(x - 4) = 0$, so $x = 0$ or $x = 4$.
6. **A — 600** Multiply coefficients to get 6 and add exponents: $10^4 \times 10^{-2} = 10^2$; result 600.
7. **A — 6** Add equations to get $3x = 21$, so $x = 7$ and $y = 13 - 7 = 6$.
8. **C — 1/6** Six of 36 ordered outcomes sum to 7, so probability = $6/36 = 1/6$.
9. **B — $x > -4$** Subtract 4: $-3x < 12$. Divide by -3 and reverse the sign: $x > -4$.
10. **C — 792** After the increase it is 880; 10% of 880 is 88, leaving 792.
11. **B — -2/3** Solve for y: $y = -(2/3)x + 4$, so slope is -2/3.
12. **B — 15 cm** By the Pythagorean theorem, $c^2 = 9^2 + 12^2 = 225$, so $c = 15$ cm.
13. **C — $y = 2x + 1$** Slope = $(13 - 5)/(6 - 2) = 2$; using (2,5), intercept = 1.
14. **D — \$80** Sort the sales: 60, 70, 80, 90, 100. The middle value is \$80.
15. **B — -3 only** The numerator is zero at -3 and 3, but $x = 3$ makes the denominator zero. Only -3 is allowed.
16. **D — 90π cm³** Volume = $\pi r^2 h = \pi(3^2)(10) = 90\pi$ cm³.
17. **A — -7** A square is at least zero, and it is zero when $x = 2$; minimum y is -7.
18. **B — 10** Order does not matter: choose 2 of 5 in $(5 \times 4)/2 = 10$ ways.
19. **D — 108 cm²** New sides are 9 and 12 cm; area = $9 \times 12 = 108$ cm².
20. **C — 2** $125 = 5^3$, so $x + 1 = 3$ and $x = 2$.
21. **C — 6** $|-12| = 12$ and $|5 - 11| = 6$; $12 - 6 = 6$.
22. **B — 148 cm²** Surface area = $2(4 \times 5 + 4 \times 6 + 5 \times 6) = 2(74) = 148$ cm².
23. **D — 12π cm²** A 120° sector is one-third of the circle; $(1/3)\pi(6^2) = 12\pi$ cm².
24. **C — 35%** 14 of 40 chose soccer: $14/40 = 0.35 = 35\%$.
25. **C — $\sqrt{18}$** $\sqrt{18} = 3\sqrt{2}$, which is irrational. The other choices are rational.
26. **A — 240 miles** Speed is $150 \div 2.5 = 60$ mph; in 4 hours it travels 240 miles.
27. **B — 100** The page charge is $\$20 - \$12 = \$8$; $\$8 \div \$0.08 = 100$ pages.
28. **D — 40 m** Width = $96 \div 12 = 8$ m. Perimeter = $2(12 + 8) = 40$ m.
29. **A — $3x^2y + xy^2$** Distribute the negative sign, then combine like terms: $2x^2y - 3xy^2 + x^2y + 4xy^2 = 3x^2y + xy^2$.
30. **A — 7/4** The reciprocal of 2/3 is 3/2; $3/2 + 1/4 = 7/4$.
31. **C — 10** The horizontal and vertical changes are 6 and 8, so distance = $\sqrt{6^2 + 8^2} = 10$.
32. **D — 3/28** First white probability is 3/8; second is 2/7; product is $6/56 = 3/28$.
33. **B — 8** Exterior angles sum to 360°; $360 \div 45 = 8$ sides.
34. **A — 17** First $h(3) = 9$, then $g(9) = 2(9) - 1 = 17$.
35. **D — It does not change.** The middle (third) value remains 4 after replacing the largest value.
36. **B — 112 m²** Actual dimensions are $3.5 \times 4 = 14$ m and $2 \times 4 = 8$ m. Area = $14 \times 8 = 112$ m².
37. **B — 60%** The result is 40% of the original, a decrease of 60%.
38. **D — 115°** The exterior angle equals the sum of the two remote interior angles: $40^\circ + 75^\circ = 115^\circ$.
39. **A — 1** The left side is $(x - 3)^2$, which equals zero only at $x = 3$; there is one distinct real solution.
40. **A — $4\sqrt{2}$** $\sqrt{72} = 6\sqrt{2}$ and $\sqrt{8} = 2\sqrt{2}$, so the difference is $4\sqrt{2}$.
41. **B — Students chosen randomly from all grade levels** A random sample across the school reduces the selection bias in the other three samples.
42. **B — 1:3** Cone volume is one-third of base area times height; cylinder volume is base area times height.
43. **C — -4** As x rises 2, y rises 6, so slope is 3. Using $x = 2$ and $y = 2$, the rule is $y = 3x - 4$; intercept = -4.
44. **D — 6/7** Multiply a/b by b/c : $(3/5)(10/7) = 30/35 = 6/7$.
45. **D — (-2, -7)** The other coordinates satisfy $(8 + x)/2 = 3$ and $(5 + y)/2 = -1$, giving $x = -2$, $y = -7$.
46. **C — 84** Combined total = $12 \times 80 + 8 \times 90 = 1,680$; divide by 20 students to get 84.
47. **D — 1,800 L** Three-fourths remains: $(3/4)(2.4) = 1.8$ m³, or 1,800 liters.