

Upward Bound Math & Science Center – STATE

ACT & SAT Preparation (Math Section)

ACT Math Details (Review of what's covered):

- Questions: 60 (60 minutes)
- Use of calculator throughout
- 60% of Math: Content covers: complex number systems, algebra, functions, geometry, and statistics and probability (these are essential for college mathematics)
- 40% of Math: Synthesis information using rates and percentages, proportions, area, surface area, and volume; average and median, and understand connections; modeling
- Knowledge of formulas and ability to compute are necessary for problems

TIPS: <http://www.act.org/content/act/en/products-and-services/the-act/test-preparation/math-practice-test-questions.html?page=0&chapter=0>

PRACTICE: <http://www.act.org/content/act/en/products-and-services/the-act/test-preparation.html> (scroll down the page)

SAT Math Details (Review of what's covered):

- Questions: No Calculator use – 20 (25 minutes) and Calculator use – 38 (55 minutes)
- Content covers: Algebra, problem solving and data analysis, advanced math such as complex equations
- Also covers: geometry, trigonometry related to college courses

TIPS: <https://collegereadiness.collegeboard.org/sat/taking-the-test>

PRACTICE: <https://collegereadiness.collegeboard.org/sat/practice> (scroll down the page)

ACT MATH

1. What is the degree measure of the acute angle formed by the hands of a 12-hour clock that reads exactly 1 o'clock?

- A. 15°
- B. 30°
- C. 45°
- D. 60°
- E. 72°

2. What is the probability that a number selected at random from the set $\{2, 3, 7, 12, 15, 22, 72, 108\}$ will be divisible by both 2 and 3 ?

- F. $\frac{1}{4}$
- G. $\frac{3}{8}$
- H. $\frac{3}{5}$
- I. $\frac{5}{8}$
- J. $\frac{7}{8}$

3. Which of the following equations represents the linear relationship between time, t , and velocity, v , shown in the table below?

t	0	1	2
v	120	152	184

- F. $v = 32t$
- G. $v = 32t + 120$
- H. $v = 120t$
- I. $v = 120t + 32$
- J. $v = 120t + 120$

4. If $n = 8$ and $16 \cdot 2^m = 4^{n-8}$, then $m = ?$

- F. -4
- G. -2
- H. 0
- I. 1
- J. 8

5. Which of the following statements *must* be true whenever n , a , b , and c are positive integers such that $n < a$, $c > a$, and $b > c$?

- A. $a < n$
- B. $b - n > a - n$
- C. $b < n$
- D. $n + b = a + c$
- E. $2n > a + b$

A circle has a circumference of 16π feet. What is the radius of the circle, in feet?

- A. $\sqrt{8}$
- B. 4
- C. 8
- D. 16
- E. 32

SAT PRACTICE

1. When 4 times the number x is added to 12, the result is 8. What number results when 2 times x is added to 7 ?

- A) -1
- B) 5
- C) 8
- D) 9

2. The graph of a line in the xy -plane has slope 2 and contains the point $(1, 8)$. The graph of a second line passes through the points $(1, 2)$ and $(2, 1)$. If the two lines intersect at the point (a, b) what is the value of $a + b$?

- A) 4
- B) 3
- C) -1
- D) -4

ACT SCIENCE (ENGLISH)**Passage II**

A teacher provided the table below to the students in a science class. The table gives 5 properties for each of Samples A–H. The students were told to assume that each sample is a completely solid cube composed of a single hypothetical pure substance.

Sample	Mass (g)	Volume (cm ³)	Density (g/cm ³)	Melting point (°C)	Boiling point (°C)
A	8.0	4.0	2.0	126	747
B	8.0	4.0	2.0	342	959
C	6.0	3.0	2.0	237	885
D	6.0	3.0	2.0	237	885
E	8.0	2.0	4.0	126	747
F	8.0	2.0	4.0	126	747
G	4.0	1.0	4.0	126	747
H	4.0	1.0	4.0	342	959

Note: Assume that mass, volume, and density were determined at 20°C and that all 5 properties were determined at 1 atmosphere (atm) of pressure.

The teacher asked each of 4 students to explain how these data could be used to predict which samples are composed of the same substance.

Student 1

If 2 samples have the same values for all 5 properties, they are composed of the same substance. If 2 samples have different values for any of the 5 properties, they are composed of different substances.

Student 2

If 2 samples have the same values for any 3 or more of the 5 properties, they are composed of the same substance. If 2 samples have the same values for fewer than 3 of the 5 properties, they are composed of different substances.

Student 3

If 2 samples have the same mass, volume, and density, they are composed of the same substance. If 2 samples have different values for any of these 3 properties, they are composed of different substances. Neither melting point nor boiling point, by itself, can distinguish between substances.

Student 4

If 2 samples have the same density, melting point, and boiling point, they are composed of the same substance. If 2 samples have different values for any of these 3 properties, they are composed of different substances. Neither mass nor volume, by itself, can distinguish between substances.

7. Based on Student 1's explanation, the same substance composes both of the samples in which of the following pairs?
- A. Samples A and B
 - B. Samples B and C
 - C. Samples C and D
 - D. Samples D and E

ACT / SAT ANSWERS

ACT Math

1. B. 30 degrees
2. G. $\frac{3}{8}$
3. G. $v = 32t + 120$
4. F. -4
5. B
6. C. $8=r$

SAT Math

1. B. 5
2. B. 3

ACT Science

#7. C