

NINTH YEAR MATHEMATICS—JUNE 1962 (1)

Course 1—Elementary Algebra (Sample Examination)

Instructions

It is wise to divide your time so that you may complete the entire examination in *three hours*. Excess time may be used in reviewing your paper for errors.

Part I

Directions (1-30): Answer all questions in this part. Write the answer to each question in the space provided at the right. No work need be shown for this part. Each correct answer will receive 2 credits. [60]

1. Subtract $t^2 - t + 4$ from $2t^2 - t + 3$.
2. Divide $3x^2 - 5x - 2$ by $x - 2$.
3. Solve for a : $3(5 + a) = 4a + 17$
4. Solve for n : $1.1n = 7.6 - .42n$
5. Write an expression for the perimeter of a square whose side is represented by $\frac{1}{4}s - 7$.
6. Given the formula $p = 2a + 2b$. Express a in terms of p and b .
7. Factor completely: $3x^2 - 48$
8. Express the number of minutes in k seconds.
9. Perform the indicated operations and combine like terms:
 $(3x + 5)(x - 2) - 7(x - 1)$
10. Solve for m : $\frac{3 + m}{2 - m} = \frac{7}{3}$
11. What is the length of the hypotenuse of a right triangle whose legs are 8 and 15?
12. Find the value of $\sqrt{74}$ to the nearest tenth.
13. A farmer raised 1,350 bushels of grain on a 30-acre plot. How many bushels can he expect to raise under similar conditions on a 40-acre plot?
14. Express the fraction $\frac{x^2 - 7x + 12}{x^2 - 3x}$ in lowest terms.

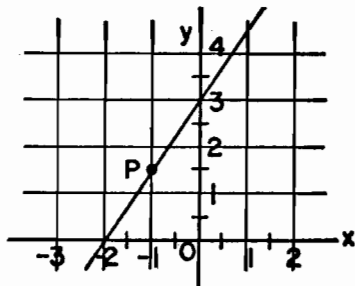
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15. Write an equation expressing the relationship between x and y as shown in the table:

x	0	1	2	3
y	2	3	4	5

16. Point P lies on the graph of $2x - y = 1$. If the abscissa of P is 2, what is the ordinate of P ?
17. Solve for a : $\frac{2a}{3} - \frac{a}{2} = 2$
18. There are 640 pupils enrolled in a certain school. One day 32 pupils were absent. What percent of the pupils were present that day?
19. If $m = \frac{12}{2-x}$, find the value of m when $x = -2$.
20. Find the value of $\frac{1}{2}a^3$ if $a = 2$.
21. If $\cos A = 0.5300$, find angle A to the nearest degree.
22. If $x = 10 \tan 35^\circ$, find x to the nearest integer.
23. If a plane travels 540 miles in an hour and a half, what is its average rate in miles per hour?

24. What are the coordinates of point P on the graph?



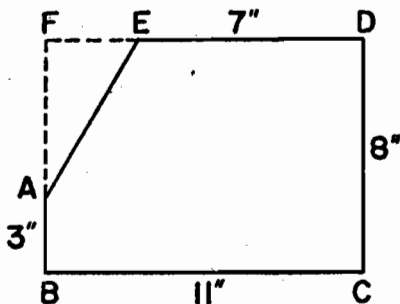
Directions (25-29): Indicate the correct completion for each of the following by writing on the line at the right the number 1, 2, 3 or 4.

25. The expression $\frac{a+b}{a^2b} + \frac{a-b}{ab^2}$ is equivalent to (1) $+1$
 (2) $\frac{(b+a)^2}{a^2b^2}$ (3) $\frac{b^2+a^2}{a^2b^2}$ (4) $\frac{2}{ab^2}$

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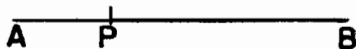
26. If n represents an integer, the square of the next larger integer is
 (1) $n^2 + 1$ (2) $n^2 + 4$ (3) $n^2 + 2n + 1$ (4) $n^2 + 4n + 4$
27. The sum of $\sqrt{50}$ and $\sqrt{18}$ is (1) $8\sqrt{2}$ (2) $15\sqrt{2}$ (3) $2\sqrt{17}$ (4) 34
28. If the average of two numbers is $2x + 1$ and one of the numbers is x , the other number is (1) $x + 1$ (2) $2x - 1$ (3) $3x + 1$ (4) $3x + 2$

29. Corner AFE is cut from the rectangle as shown in the figure. The area of the remaining polygon $ABCDE$ in square inches is



- (1) 29 (3) 78
 (2) 68 (4) 88

30. Construct a perpendicular to line segment AB at point P .



Part II

Answer four questions from this part. Show all work unless otherwise directed.

31. Solve graphically and check: [8, 2]

$$\begin{aligned} 2x + y &= 6 \\ x - 3y &= 10 \end{aligned}$$

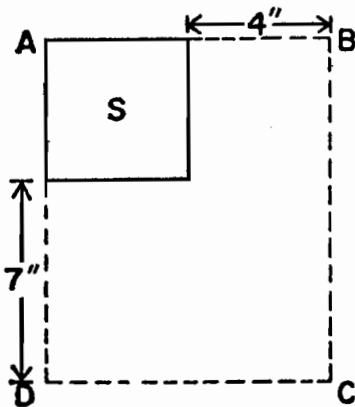
32. Write the equation or equations that may be used in solving problem *a* and problem *b*. In each case, state what the letter or letters represent. [Solution of equations is NOT required.]

- a*. Two planes took off from an airport at the same time and flew in opposite directions. One plane traveled 120 miles per hour faster than the other. At the end of three hours the planes were 1,500 miles apart. Find the average speed of the slower plane. [5]

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b. The difference between two numbers is 10. If the smaller number is increased by six times the larger number, the result is 4. Find the numbers. [5]

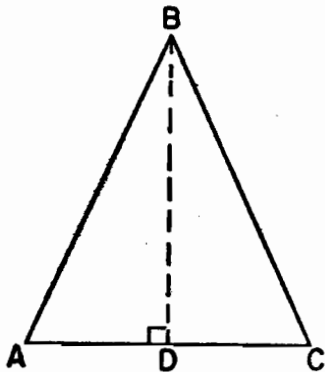
33. A business man invested one sum of money at 5% and another sum at 6%. He received an annual income of \$325 from the investments. If the rates on the two investments had been interchanged, his annual income would have been increased by \$10. What was the total number of dollars he invested? [Only an algebraic solution will be accepted.] [4, 6]



34. If the area of rectangle ABCD is 108 square inches, what is the length in inches of a side of square S? [Only an algebraic solution will be accepted.] [4, 6]

35. In triangle ABC, $AB = BC$ and altitude BD is perpendicular to base AC at its midpoint D . If $BD = 7.4$ inches and angle $A = 66^\circ$, find to the nearest tenth the length of

- a. AB [5]
b. AC [5]



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36. a. Solve and check: [5, 1]

$$\frac{6x+1}{5} - \frac{x-8}{3} = \frac{4}{15}$$

- b. Perform the indicated operations and express the result in simplest form: [4]

$$\frac{6a^2b}{a^2+ab} \times \frac{(a+b)^2}{2a} \div \frac{a+b}{3b^2}$$

- *37. Indicate on a graph the solution set of the following system of inequalities: [10]

$$\begin{aligned} y &> x \\ y - 1 &< 0 \end{aligned}$$

* This question, based on material beyond the scope of the syllabus, may be used as a *substitute* for any one of the questions in Part II by schools that have included this topic in the course.