ELEMENTARY ALGEBRA

Wednesday, August 20. 1930 — 8.30 to 11.30 a. m., only

Instructions

Do not open this sheet until the signal is given.

Answer all questions in part I and five questions from part II.

Part I is to be done first and the maximum time to be allowed for this part is one and one half hours. Merely place the answer to each question in the space provided; no work need be shown.

If you finish part I before the signal to stop is given you may begin part II. However, it is advisable to look your work over carefully before proceeding to part II, since *no credit will be given any answer in part I which is not correct and reduced to its simplest form.*

When the signal to stop is given at the close of the one and one half hour period, work on part I must cease and this sheet of the question paper must be detached. The sheets will then be collected and you should continue with the remainder of the examination.

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Fill in the following lines:

Name of school...Name of pupil.................

Detach this sheet and hand it in at the close of the one and one half hour period.

Part I

Answer all questions in this part. Each question has 2½ credits assigned to it; no partial credit should be allowed. Each answer must be reduced to its simplest form.

1 Express y yards as feet.   *Ans*............

2 The formula $d = 16t^2$ is used to find the distance in feet, d, through which an object will fall in t seconds. How far does a ball fall in 3 seconds? *Ans*............

3 Solve the equation $x^2 - 7 = 2$ *Ans*............

4 Divide $x^3 - y^3$ by $x - y$ *Ans*............

5 What are the three factors of $8a^2 - 2$?   *Ans*............

6 Subtract $\frac{2x-3}{4}$ from $\frac{3x-1}{2}$ *Ans*............

7 Simplify $2\sqrt{\frac{1}{3}}$ *Ans*............

8 Express as a single radical $3\sqrt{5} - \frac{1}{2}\sqrt{20}$ *Ans*............

9 Find the square root of 114 to the *nearest tenth*.   *Ans*............

10 The ratio of two positive numbers is $9:2$ and their product is 72; find the numbers.   *Ans*............

11 A and C are two points 1000 feet apart on level ground. B is a balloon directly above C. From A the angle of elevation of the balloon is $53°$. How high is the balloon?   *Ans*............

12 The area of a rectangle is 50 square feet and its length and width are represented by l and w respectively; does l increase or decrease as w increases? *Ans*............

13 Minuend, subtrahend and remainder are represented by m, s and r respectively. Write a formula that expresses the relation of these letters to one another.   *Ans*............

14 Is the equation $3x + 4y = 8$ satisfied when $x = 2$ and $y = \frac{1}{2}$? [Answer *yes* or *no*.]   *Ans*............

15 Solve the equation $\frac{3x}{4} - \frac{5}{2} = \frac{x}{3}$ *Ans*............

16 As angle A increases from $0°$ to $90°$, does $\frac{\sin A}{\cos A}$ increase or decrease? *Ans*............

17 If d pencils cost b cents, what would be the cost in cents of c pencils at the same rate?   *Ans*............

18 Solve the following set of equations for x:
$$x + 6y = 33$$
$$5x - 2y = 5$$
     Ans............

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Write at top of first page of answer paper to part II (a) names of schools where you have studied, (b) number of weeks and recitations a week in elementary algebra previous to entering summer high school, (c) number of recitations in this subject attended in summer high school of 1930.

The minimum time requirement previous to entering summer high school is five recitations a week for a school year.

For those pupils who have met the time requirement previous to entering summer high school the minimum passing mark is 65 credits; for all others 75 credits.

For admission to this examination attendance on at least 30 recitations in this subject in a registered summer high school in 1930 is required.

Part II

Answer five questions from this part. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form.

21 In a certain theater, afternoon tickets are sold at 35¢ each and evening tickets at 50¢ each. If a man paid $4.95 for 12 tickets, how many of each kind did he buy? [6, 4]

22 The length of a kite string is 250 feet. Assume that the string is a straight line and that it makes an angle of 43° with the ground. How high is the kite? [10]

23 The length of a rectangle is 2 greater than the side of a given square and the width is 2 less than a side of the same square. The diagonal of the rectangle is 20. If s represents one side of the square, find the value of s. [6, 4]

24 a Solve for F the formula $C = \frac{5}{9}(F - 32)$ [4]
   b If $V = \frac{4}{3}\pi r^3$, find V when $r = \frac{1}{2}$ and $\pi = \frac{22}{7}$ [6]

25 Indicate whether *each* of the following statements is true or false: [Write the letters a, b, c, d, e in a column and then write the word *true* or *false* after each letter.]

   a $\frac{2}{3} = \frac{4}{9}$ [2]

   b $\frac{a-b}{2} - \frac{b-a}{2} = a - b$ [2]

   c The product of sin 90° and cos 90° is zero. [2]

   d If $a = 2$, $n = 3$ and $r = 4$, then $ar^{n-1} = 64$ [2]

   e The sum of two numbers is s; if one of them is d, the other is $d - s$. [2]

26 The ratio of the numerator of a certain fraction to its denominator is $\frac{2}{3}$. If 3 is added to the numerator and 1 to the denominator, the value of the resulting fraction is $\frac{3}{4}$. Find the fraction. [6, 4]

27 Two travelers 150 miles apart start at the same time and travel toward each other at uniform rates. If one travels at the rate of 3 miles an hour and the other at the rate of 42 miles an hour, how many hours will pass before they will meet? [7, 3]

28 a Draw the graph of the equation $x = y + 3$ [4]
   b Using the same axes, draw the graph of the equation $x = 2y$ [4]
   c What are the coordinates of the point of intersection of the two graphs? [2]

The following question is based on one of the optional topics in the syllabus and may be substituted for any other question in part II.

29 Solve the following problem *graphically*:

Two trains start at the same time from stations 120 miles apart. They travel in the same direction and meet after a certain number of hours. One travels at an average rate of 35 miles an hour, the other at an average rate of 20 miles an hour. After how many hours of traveling will they meet if no allowance is made for stops? [10]