TRIGONOMETRY

Thursday, August 21, 1958 — 12 m. to 3 p.m., only

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

Part I

Answer all questions in this part. Each correct answer will receive 2½ credits. No partial credit will be allowed. Unless otherwise specified, answers may be left in terms of π or in radical form.

1 Express tan 310° as a function of a positive acute angle.　　1................

2 Find the number of radians in an angle of 200°.　　2................

3 Find the smallest positive value of A which satisfies the equation $2 \sin^2 A - 1 = 0$.　　3................

4 Find the positive value of tan (arc cos ⅔).　　4................

5 Find the antilogarithm of 1.5532.　　5................

6 Find log tan 62° 27′.　　6................

7 Find cos 53° 24′.　　7................

8 In triangle ABC, sin A = 0.2, sin B = 0.6 and b = 21. Find a.　　8................

9 In triangle ABC, $a = 4$, $b = 5$ and $c = 6$. Find the cosine of the largest angle of the triangle.　　9................

10 In triangle ABC, $C = 40°$, $a = 12$ and $b = 8$. Find tan ½(A–B) to the *nearest hundredth*.　　10................

11 The area of triangle ABC equals 18. Side $a = 8$ and $C = 13°$. Find b.　　11................

12 If sin $A = ¼$ and A is an acute angle, find sin $2A$.　　12................

13 Find to the *nearest degree* the angle of elevation of the sun when a tree 30 feet high casts a shadow 12 feet long.　　13................

14 If A is a positive acute angle, express sin A in terms of cot A.　　14................

15 Using the data $A = 42°$, $a = 15$ and $b = 11$, determine the number of different triangles that can be constructed.　　15................

[1]　　[OVER]

Directions (16–20) : Indicate the correct completion for *each* of the following by writing the letter *a, b, c* or *d* on the line at the right.

16 The minimum value of $\frac{1}{2}$ sin $2x$ is   (*a*) 0   (*b*) —$\frac{1}{2}$ (*c*) —1   (*d*) —2   16................

17 Sin (— 115°) is equal to   (*a*) sin 115°   (*b*) — cos 115°   (*c*) — sin 65°
(*d*) — cos 65°   17................

18 Cos x and csc x are reciprocals   (*a*) for all values of x (*b*) for no value
of x (*c*) when x has the values 45° and 135°   (*d*) when x has the
values 45° and 225°   18................

19 The number of radians in a central angle which subtends an arc equal to
two-thirds of a diameter of the circle is   (*a*) $\dfrac{2}{3}$ (*b*) $\dfrac{2}{3}$ π

(*c*) $\dfrac{4}{3}$ (*d*) $\dfrac{4}{3}$ π 19................

20 Sin 80° — sin 20° equals   (*a*) sin 50°   (*b*) cos 50°   (*c*) sin 60°
(*d*) cos 60°   20................

[2]

Part II
Answer three questions from this part. Show all work unless otherwise directed.

21 Solve the following equation for positive values of A less than $360°$. [Express approximate values of A to the *nearest degree*.]

$$4 \sec^2 A + \tan A = 7 \qquad [10]$$

22 Prove *each* of the following identities:

a $\dfrac{2 \tan x - \sin 2x}{2 \sin^2 x} = \tan x$ [5]

b $\sin (120° + A) + \sin (60° + A) = \sqrt{3} \cos A$ [5]

23 a *Sketch* the graph of $y = \sin 2x$ as x varies from 0 to π radians. [4]

b On the set of axes used in part a, *sketch* the graph of $y = \frac{1}{2} \cos x$ as x varies from 0 to π radians. [4]

c From the graphs drawn in parts a and b, determine the number of values of x between 0 and π radians which satisfy the equation $\sin 2x - \frac{1}{2} \cos x = 0$. [2]

24 *Derive* the law of cosines for an acute triangle. [10]

25 If $\sin x = -\frac{4}{5}$ and $\tan x$ is positive, find, *without* the use of trigonometric tables, the value of

a $\cos x$ [2]
b $\sin 2x$ [2]
c $\cos \frac{1}{2} x$ [3]
d $\tan (45° + x)$ [3]

Part III
Answer two questions from this part. Show all work.

26 In triangle ABC, $AB = 31.5$, $BC = 56.7$ and $AC = 41.2$. Find angle A to the *nearest ten minutes*. [10]

27 The diagonals of a parallelogram intersect at an angle of $65°$. The shorter diagonal is 10 inches and the longer is 22 inches. Find, to the *nearest inch*, the sides of the parallelogram. [6, 4]

28 A ship starts from point A 29 miles directly west of seaport C and follows a course S $46°$ W for 51 miles to point B. Find to the *nearest degree* the bearing of C from B. [5, 4, 1]

29 From the top of a cliff the angles of depression of the top and bottom of a lighthouse are $25°$ and $44°$, respectively. The lighthouse is 50 feet high and its base is at sea level. Find the height of the cliff to the *nearest foot*. [10]

[3]

FOR TEACHERS ONLY

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INSTRUCTIONS FOR RATING

TRIGONOMETRY

Thursday, August 21, 1958 — 12 m. to 3 p.m., only

Use only *red* ink or pencil in rating Regents papers. Do not attempt to *correct* the pupil's work by making insertions or changes of any kind. Use check marks to indicate pupil errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. In problems involving logarithms, answers should be left correct to four significant digits unless directions say otherwise. Units need not be given when the wording of the questions allows such omissions.

Part I

Allow $2\frac{1}{2}$ credits for each correct answer; allow no partial credit. Do not allow credit if the answer to question 5 is not expressed to *four significant digits* and if the answers to questions 6 and 7 are not expressed to *four* decimal places. For questions 16–20, allow credit if the pupil has written the correct answer instead of the letter *a, b, c* or *d*.

(1) —tan 50° *or* —cot 40°

(2) $\dfrac{10\pi}{9}$ *or* 3.5

(3) 45°

(4) $\dfrac{\sqrt{5}}{2}$ *or* 1.1

(5) 35.74

(6) 0.2826

(7) 0.5962

(8) 7

(9) $\frac{1}{8}$

(10) 0.55

(11) 20

(12) $\dfrac{\sqrt{15}}{8}$ *or* 0.5

(13) 68

(14) $\dfrac{1}{\sqrt{\cot^2 A + 1}}$

(15) 1

(16) *b*

(17) *c*

(18) *d*

(19) *c*

(20) *b*