

# 9

## NINTH YEAR MATHEMATICS

Friday, June 17, 1966 — 1:15 to 4:15 p.m., only

The last page of the booklet is the answer sheet, which is perforated. Fold the last page along the perforation and then, slowly and carefully, tear off the answer sheet. Now fill in the heading of your answer sheet. When you have finished the heading, you may begin the examination immediately.

### Part I

Answer all questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Write your answers in the spaces provided on the separate answer sheet.

1 Solve for  $y$ :  $3y = 2(5 - y)$

2 Find the sum of  $8x^2 - 3x - 2$  and  $5x - 3$ .

3 In 3 days a car traveled 573 miles. At the same average rate, how many miles can the car travel in 5 days?

4 Find the numerical value of  $b^2 - 4a$  when  $a = 3$  and  $b = 2$ .

5 Solve the following proportion for  $p$ :  $\frac{2}{3} = \frac{p - 2}{15}$

6 If 75% of  $x$  is 210, find the value of  $x$ .

7 Solve for  $x$ :  $\frac{x}{3} + \frac{3x}{4} = \frac{13}{2}$

8 Solve for  $y$  in terms of  $a$ ,  $b$  and  $c$ :  $ay + b = c$

9 A side of a square is represented by  $3x - 2$ . Express the perimeter of the square in terms of  $x$ .

10 Express the fraction  $\frac{x^2 - 9}{4x + 12}$  in its lowest terms.

11 Solve for the *positive* value of  $x$ :  $3x^2 - 192 = 0$

12 Solve for  $x$ :  $.15x = 5.25$

13 A man can do a certain job in 12 hours. Express, in terms of  $x$ , the fractional part of the job he can do in  $x$  of those hours.

14 Find the square root of 46 to the *nearest tenth*.

15 A vertical tower standing on level ground casts a shadow 120 feet long at the same time that a 20-foot telephone pole casts a shadow 15 feet long. What is the number of feet in the height of the tower?

16 Perform the indicated operations and combine like terms:  
 $x(x - 3) - (x^2 - 2x + 9)$

17 The length of a rectangle is 8 feet and its width is 6 feet. Express in feet the length of a diagonal of the rectangle.

18 Which has the greatest value?

$$\frac{3}{11}, \frac{4}{11}, \frac{4}{13}, \text{ or } \frac{5}{12}$$

*Directions (19-29):* Write in the space provided on the separate answer sheet the *number* preceding the expression that best completes *each* statement or answers *each* question.

19 The product of  $7y^3$  and  $4y^5$  is  
(1)  $11y^8$  (3)  $28y^8$   
(2)  $11y^{15}$  (4)  $28y^{15}$

20 The quotient of  $(2x^3 - 3x^2) \div x^2$  is  
(1)  $2x^3 - 1$  (3)  $2x - 3x^2$   
(2)  $2x - 3$  (4)  $2x^5 - 3x^4$

21 A set of factors for the expression  $12x^2 - x - 1$  is  
(1)  $(3x + 1)(4x - 1)$   
(2)  $(2x - 1)(6x + 1)$   
(3)  $(3x - 1)(4x + 1)$   
(4)  $(6x - 1)(2x + 1)$

22 The sum of the squares of two consecutive integers is 13. If  $n$  represents the smaller integer, which equation can be used to find  $n$ ?

- (1)  $n^2 + (n + 2)^2 = 13$   
 (2)  $n^2 + (n + 1)^2 = 13$   
 (3)  $n^2(n + 1)^2 = 13$   
 (4)  $n^2(n + 2)^2 = 13$

23 The expression  $(y - 6)^2$  is equivalent to

- (1)  $y^2 - 6y + 36$                       (3)  $y^2 - 12y + 36$   
 (2)  $y^2 + 36$                               (4)  $y^2 - 12y - 36$

24 The graph of  $x + 3y = 6$  intersects the  $y$ -axis in the point

- (1) (0,2)                                      (3) (6,0)  
 (2) (0,18)                                    (4) (3,6)

25 The irrational number  $\sqrt{80}$  is equal to

- (1)  $16\sqrt{5}$                                     (3)  $5\sqrt{16}$   
 (2)  $6\sqrt{5}$                                     (4)  $4\sqrt{5}$

26 The graphs of  $2x - y = 3$  and  $x + y = -6$  have a point in common whose coordinates are

- (1) (-8,2)                                    (3) (3,-9)  
 (2) (-1,-5)                                (4) (3,-6)

27 The result of the indicated operation

$$\frac{2a-1}{3} - \frac{a-2}{4} \text{ is}$$

- (1)  $\frac{a-3}{7}$                                       (3)  $\frac{5a-10}{12}$   
 (2)  $\frac{5a+2}{12}$                                     (4)  $\frac{a+1}{7}$

28 If  $2x^2 + 7x - 15$  is divided by  $2x - 3$ , the remainder is

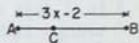
- (1) -30                                        (3) -9  
 (2) 0    (4) -21

29 If  $\cos A = .6800$ , the measure of angle  $A$  to the nearest degree is

- (1) 30                                         (3) 43  
 (2) 34                                         (4) 47

30 Answer either *a* or *b* but not both:

*a* The length of line segment  $AB$  as shown in the accompanying figure is represented by  $3x - 2$ . If the length of  $AC = x + 1$ , express the length of line segment  $CB$  in terms of  $x$ .



OR

*b* On the separate answer sheet, using compasses and straight edge, construct the midpoint of line segment  $RS$ .

## Part II

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

- 31 A part of \$4,000 is invested at 6% and the rest at 4%. If the annual income from each investment is the same, find the amount invested at each rate. Check. [5, 4, 1]

- 32 Solve graphically and check: [8, 2]

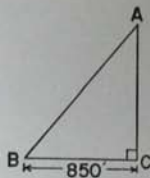
$$\begin{aligned} 2y - x &= 4 \\ y &= -2x - 3 \end{aligned}$$

- 33 A freight train left Chicago at 9 a.m. traveling south at 30 miles per hour. At noon a passenger train left the same station, traveling south over the same route at 55 miles per hour.

- a How many hours does the passenger train travel to overtake the freight? [5, 3]  
b How many miles from Chicago will they be at this time? [2]

- 34 The length of a rectangle is three times its width. If the width is diminished by 1 inch and the length increased by 3 inches, the area of the new rectangle will be 72 square inches. Find the dimensions of the original rectangle. Check. [5, 4, 1]

- 35 a The height of a cloud over an airport at night is determined by projecting a light vertically upward to the cloud. At a point on the ground 850 feet from the light, as shown in the accompanying figure, the angle of elevation of the spot where the light hits the cloud is found to be  $58^\circ$ . Find the height of the cloud to the nearest foot. [6]



- b The length of the diagonal of a square is 12 feet. Find to the nearest foot the length of a side of the square. [4]

- 36 Write an equation or a system of equations which can be used to solve each of the following problems. In each case state what the variable or variables represent. [Solution of the equations is not required.]

- a Find two consecutive integers such that the square of the larger diminished by 5 times the smaller is equal to 71. [5]  
b Jack, Walt and Randy each have a paper route and receive a total of \$6.75 for delivering newspapers. If the number of papers they deliver is in the ratio of 2 : 3 : 4, respectively, what is Randy's share? [5]

- \*37 The following is an example of a mathematical proof consisting of five steps with four of the reasons omitted:

$$\text{To prove: } 2(1 + 3x) - 6x = 2$$

$$\text{Let } 2(1 + 3x) - 6x = y$$

Steps	Reasons
a $2 + 6x - 6x = y$	....
b $2 + (6x - 6x) = y$	....
c $2 + 0 = y$	....
d $2 = y$	....
e $2(1 + 3x) - 6x = 2$	...9.

Each step in this proof is backed by one of these properties as a reason:

- (1) Commutative property of addition
- (2) Associative property of addition
- (3) Distributive property
- (4) Additive property of zero
- (5) Commutative property of multiplication
- (6) Associative property of multiplication
- (7) Multiplicative property of zero
- (8) Additive inverse property
- (9) Substitution property

Write the letters *a* through *d* on your answer paper. After each letter write the *number* of the property used as the reason for that step. [Do not use property No. 9.] [2, 2, 3, 3]

- \*38 a On the same set of axes graph the solution set for the following system of inequalities and label the solution set *A*: [8]

$$\begin{aligned} y - 4 &\leq 0 \\ y &> 2x \end{aligned}$$

- b Name an ordered pair in the solution set of this system. [1]

- c Name an ordered pair which is in the solution set of  $y > 2x$  but not in the solution set of  $y - 4 \leq 0$ . [1]

\*These questions are based on material beyond the scope of the syllabus.

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ANSWER SHEET

Pupil.....Teacher.....

School.....

Your answers to Part I should be recorded on this answer sheet.

Part I

Answer all questions in this part.

- |        |         |         |
|--------|---------|---------|
| 1..... | 9.....  | 17..... |
| 2..... | 10..... | 18..... |
| 3..... | 11..... | 19..... |
| 4..... | 12..... | 20..... |
| 5..... | 13..... | 21..... |
| 6..... | 14..... | 22..... |
| 7..... | 15..... | 23..... |
| 8..... | 16..... | 24..... |

Part I Score:.....
Rater's Initials: .....

Questions 25 through 30 should be answered on the back of this page.

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- 25.....
- 26.....
- 27.....
- 28.....
- 29.....
- 30 a.....

OR

b

R ————— S

Tear Here

# FOR TEACHERS ONLY

## 9

### SCORING KEY NINTH YEAR MATHEMATICS

Friday, June 17, 1966—1:15 to 4:15 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 checkmarks to indicate pupil errors.

Unless otherwise specified, mathematically correct variations in the answers will be allowed. Units need not be given when the wording of the questions allows such omissions.

#### Part I

Allow 2 credits for each correct answer; allow no partial credit. In questions 19–29, allow credit if the pupil has written the correct answer instead of the number 1, 2, 3 or 4.

(1) 2

(2)  $8x^2 + 2x - 5$

(3) 955

(4) -8

(5) 12

(6) 280

(7) 6

(8)  $\frac{c-b}{a}$

(9)  $12x - 8$

(10)  $\frac{x-3}{4}$

(11) 8

(12) 35

(13)  $\frac{x}{12}$

(14) 6.8

(15) 160

(16)  $-x - 9$

(17) 10

(18)  $\frac{4}{11}$

(19) 3

(20) 2

(21) 3

(22) 2

(23) 3

(24) 1

(25) 4

(26) 2

(27) 2

(28) 2

(29) 4

(30)  $a - 2x - 3$

[OVER]

## Part II

Please refer to the Department's pamphlet *Suggestions on the Rating of Regents Examination Papers in Mathematics*. Care should be exercised in making deductions as to whether the error is purely a mechanical one or due to a violation of some principle. A mechanical error generally should receive a deduction of 10 percent, while an error due to a violation of some cardinal principle should receive a deduction ranging from 30 percent to 50 percent, depending on the relative importance of the principle in the solution of the problem.

(31) Analysis [5]  
 $\$1,600$  at 6%,  $\$2,400$  at 4% [4]

(33) a Analysis [5]  
 $3\frac{1}{2}$  [3]  
 b 198 [2]

(34) Analysis [5]  
 15, 5 [4]

(35) a 1360 [6]  
 b 8 [4]

(36) a  $n$  = the smaller integer  
 b  $2x$  = Jack's share  
 $3x$  = Walt's share  
 $4x$  = Randy's share

$$(n + 1)^2 - 5n = 71 \quad [5]$$

$$2x + 3x + 4x = \$6.75 \quad [5]$$

(37) a 3 [2]  
 b 2 [2]  
 c 8 [3]  
 d 4 [3]

(38) a The region labeled A, boundary line  $y = 4$  included, and boundary line  $y = 2x$  excluded. [8]

