

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

INTEGRATED ALGEBRA

Thursday, January 30, 2014 — 9:15 a.m. to 12:15 p.m., only

Student Name: _____

School Name: _____

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

A separate answer sheet for Part I has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 39 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in Parts II, III, and IV directly in this booklet. All work should be written in pen, except graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

Notice...

A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

Answer all 30 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [60]

Use this space for computations.

1 An example of an equation is

(1) $2x^2 - 4x + 12$

(3) $4(x + 6)(x - 2)$

(2) $|x - 6|$

(4) $2x = x^2 + 3$

2 The greatest common factor of $3m^2n + 12mn^2$ is

(1) $3n$

(3) $3mn$

(2) $3m$

(4) $3mn^2$

3 Jeremy is hosting a Halloween party for 80 children. He will give each child *at least* one candy bar. If each bag of candy contains 18 candy bars, which inequality can be used to determine how many bags, c , Jeremy will need to buy?

(1) $18c \geq 80$

(3) $\frac{c}{18} \geq 80$

(2) $18c \leq 80$

(4) $\frac{c}{18} \leq 80$

4 Which statement regarding biased sampling is *false*?

(1) Online sampling is biased because only the people who happen to visit the web site will take the survey.

(2) A radio call-in survey is biased because only people who feel strongly about the topic will respond.

(3) A survey handed to every third person leaving a library is biased because everyone leaving the library was not asked to participate.

(4) Asking for experts to take a survey is biased because they may have particular knowledge of the topic.

Use this space for
computations.

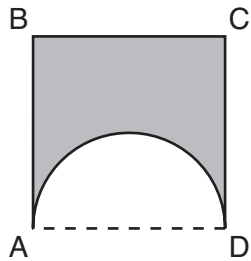
5 Which relation is *not* a function?

- (1) $\{(2,4), (1,2), (0,0), (-1,2), (-2,4)\}$
- (2) $\{(2,4), (1,1), (0,0), (-1,1), (-2,4)\}$
- (3) $\{(2,2), (1,1), (0,0), (-1,1), (-2,2)\}$
- (4) $\{(2,2), (1,1), (0,0), (1,-1), (2,-2)\}$

6 What is an equation of the line that passes through the point $(-2, -8)$ and has a slope of 3?

- (1) $y = 3x - 2$
- (2) $y = 3x - 22$
- (3) $y = 3x + 2$
- (4) $y = 3x + 22$

7 A figure consists of a square and a semicircle, as shown in the diagram below.

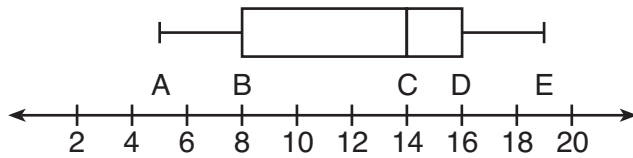


If the length of a side of the square is 6, what is the area of the shaded region?

- (1) $36 - 3\pi$
- (2) $36 - 4.5\pi$
- (3) $36 - 6\pi$
- (4) $36 - 9\pi$

Use this space for computations.

- 8 The box-and-whisker plot shown below represents the number of magazine subscriptions sold by members of a club.



Which statistical measures do points B , D , and E represent, respectively?

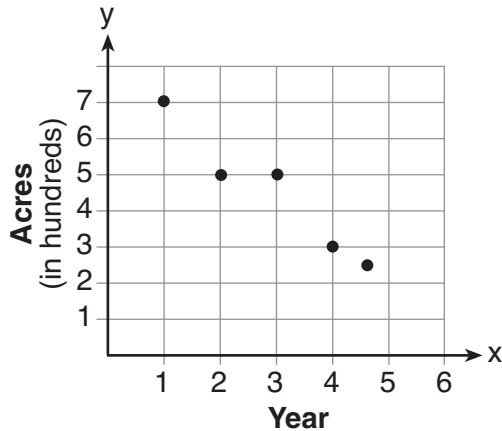
- (1) minimum, median, maximum
 - (2) first quartile, median, third quartile
 - (3) first quartile, third quartile, maximum
 - (4) median, third quartile, maximum
- 9 What is the slope of a line represented by the equation $2y = x - 4$?
- (1) 1
 - (2) $\frac{1}{2}$
 - (3) -1
 - (4) $-\frac{1}{2}$
- 10 What is the solution of the system of equations below?

$$\begin{aligned}2x + 3y &= 7 \\ x + y &= 3\end{aligned}$$

- (1) (1,2)
- (2) (2,1)
- (3) (4,-1)
- (4) (4,1)

Use this space for
computations.

- 11 The graph below illustrates the number of acres used for farming in Smalltown, New York, over several years.



Using a line of best fit, approximately how many acres will be used for farming in the 5th year?

- (1) 0
(2) 200
(3) 300
(4) 400
- 12 When $16x^3 - 12x^2 + 4x$ is divided by $4x$, the quotient is
- (1) $12x^2 - 8x$
(2) $12x^2 - 8x + 1$
(3) $4x^2 - 3x$
(4) $4x^2 - 3x + 1$

- 13 The width of a rectangle is 4 less than half the length. If ℓ represents the length, which equation could be used to find the width, w ?

- (1) $w = \frac{1}{2}(4 - \ell)$
(2) $w = \frac{1}{2}(\ell - 4)$
(3) $w = \frac{1}{2}\ell - 4$
(4) $w = 4 - \frac{1}{2}\ell$

**Use this space for
computations.**

14 Which data can be classified as quantitative?

- (1) favorite stores at which you shop
- (2) U.S. Representatives and their home states
- (3) sales tax rate in each New York county
- (4) opinion of a freshman on the color of Paul's shirt

15 Two cubes with sides numbered 1 through 6 were rolled 20 times. Their sums are recorded in the table below.

4	9	8	9	2
9	4	6	12	10
8	7	9	11	10
8	7	9	3	5

What is the empirical probability of rolling a sum of 9?

- (1) $\frac{4}{20}$
- (2) $\frac{5}{20}$
- (3) $\frac{4}{36}$
- (4) $\frac{5}{36}$

16 What is the vertex of the graph of the equation $y = 3x^2 + 6x + 1$?

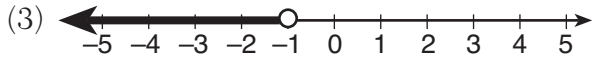
- (1) $(-1, -2)$
- (2) $(-1, 10)$
- (3) $(1, -2)$
- (4) $(1, 10)$

17 The length and width of a rectangle are 48 inches and 40 inches. To the *nearest inch*, what is the length of its diagonal?

- (1) 27
- (2) 62
- (3) 88
- (4) 90

Use this space for
computations.

18 Which graph represents the solution set of $2x - 5 < 3$?



19 Jonathan drove to the airport to pick up his friend. A rainstorm forced him to drive at an average speed of 45 mph, reaching the airport in 3 hours. He drove back home at an average speed of 55 mph. How long, to the *nearest tenth of an hour*, did the trip home take him?

- (1) 2.0 hours (3) 2.8 hours
(2) 2.5 hours (4) 3.7 hours

20 The expression $\frac{2n}{5} + \frac{3n}{2}$ is equivalent to

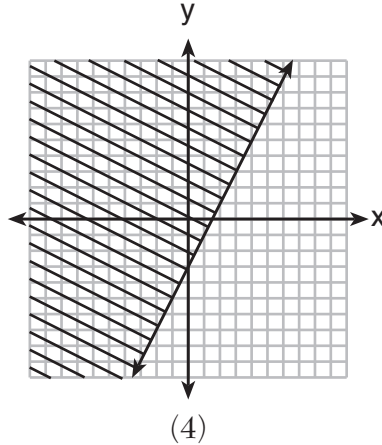
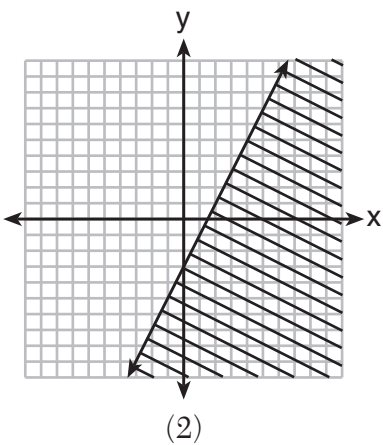
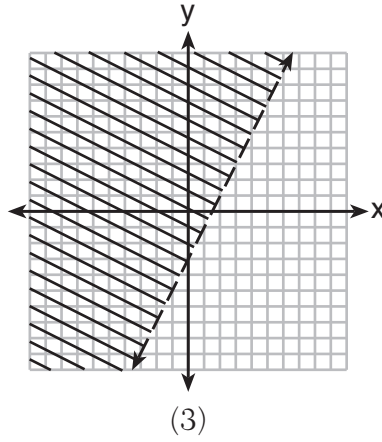
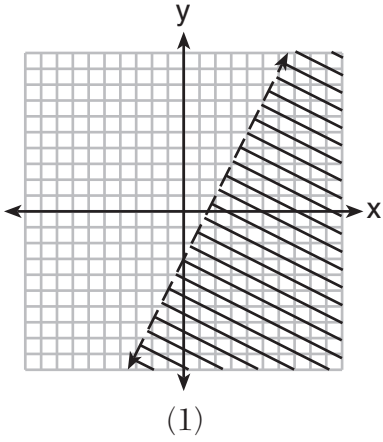
- (1) $\frac{5n}{7}$ (3) $\frac{19n}{10}$
(2) $\frac{6n^2}{10}$ (4) $\frac{7n}{10}$

Use this space for computations.

21 When $x = 4$, the value of $2x^0 + x!$ is

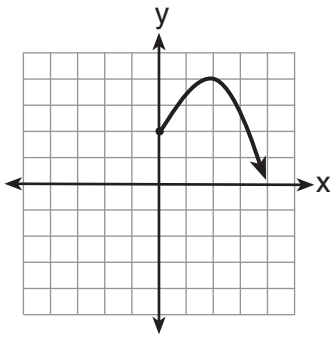
- (1) 24 (3) 26
(2) 25 (4) 28

22 Which graph represents the solution of $2y + 6 > 4x$?

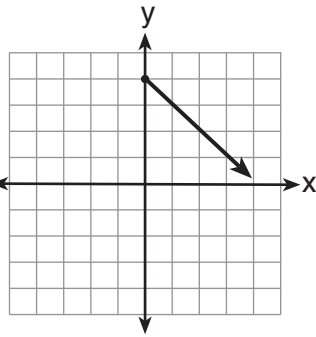


Use this space for computations.

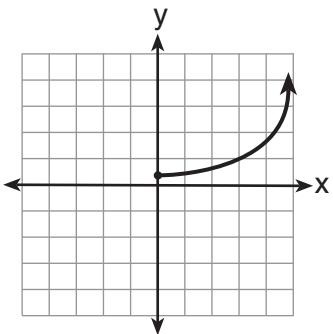
23 Which graph represents the exponential decay of a radioactive element?



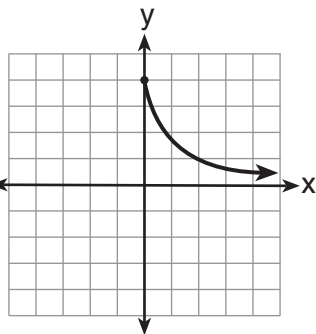
(1)



(3)



(2)



(4)

24 Which fraction represents $\frac{x^2 - 25}{x^2 - x - 20}$ expressed in simplest form?

(1) $\frac{5}{4}$

(3) $\frac{x+5}{x+4}$

(2) $\frac{x-5}{x-4}$

(4) $\frac{25}{x+20}$

25 If $abx - 5 = 0$, what is x in terms of a and b ?

(1) $x = \frac{5}{ab}$

(3) $x = 5 - ab$

(2) $x = -\frac{5}{ab}$

(4) $x = ab - 5$

26 Given:

$$U = \{x | 0 < x < 10 \text{ and } x \text{ is an integer}\}$$

$$S = \{x | 0 < x < 10 \text{ and } x \text{ is an odd integer}\}$$

The complement of set S within the universal set U is

(1) $\{0, 2, 4, 6, 8, 10\}$

(3) $\{0, 2, 4, 6, 8\}$

(2) $\{2, 4, 6, 8, 10\}$

(4) $\{2, 4, 6, 8\}$

27 The roots of the equation $2x^2 - 8x = 0$ are

(1) -2 and 2

(3) 0 and -4

(2) 0 , -2 , and 2

(4) 0 and 4

28 Which equation illustrates the multiplicative inverse property?

(1) $a \cdot 1 = a$

(3) $a\left(\frac{1}{a}\right) = 1$

(2) $a \cdot 0 = 0$

(4) $(-a)(-a) = a^2$

29 What is the result when $4x^2 - 17x + 36$ is subtracted from $2x^2 - 5x + 25$?

(1) $6x^2 - 22x + 61$

(3) $-2x^2 - 22x + 61$

(2) $2x^2 - 12x + 11$

(4) $-2x^2 + 12x - 11$

30 Julie has three children whose ages are consecutive odd integers. If x represents the youngest child's age, which expression represents the sum of her children's ages?

(1) $3x + 3$

(3) $3x + 5$

(2) $3x + 4$

(4) $3x + 6$

Part II

Answer all 3 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

31 Express $\frac{\sqrt{84}}{2\sqrt{3}}$ in simplest radical form.

32 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

Text-Use Interval (minutes)	Cumulative Frequency
41–50	2
41–60	5
41–70	10
41–80	19
41–90	31

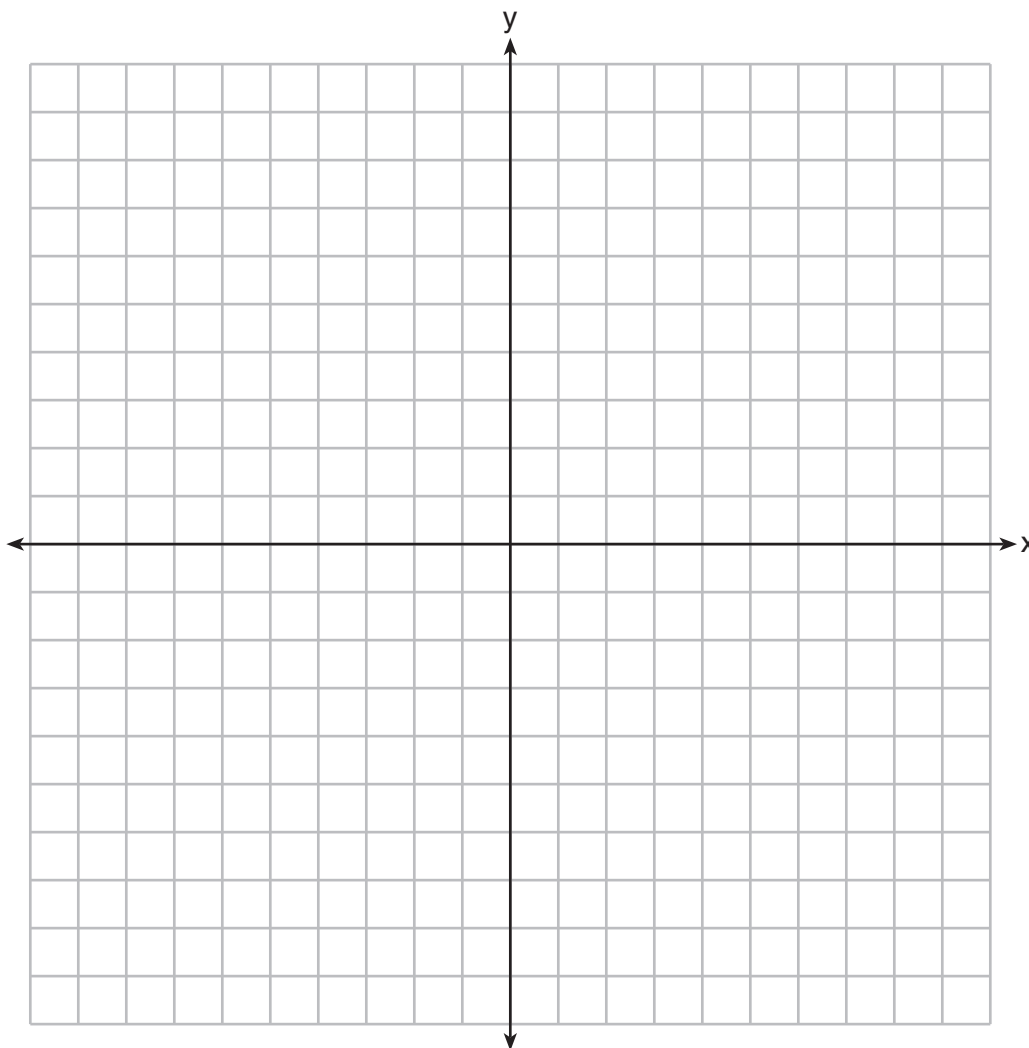
Determine which 10-minute interval contains the median. Justify your choice.

33 Kirsten invested \$1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the *nearest cent*, at the end of 5 years.

Part III

Answer all 3 questions in this part. Each correct answer will receive 3 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [9]

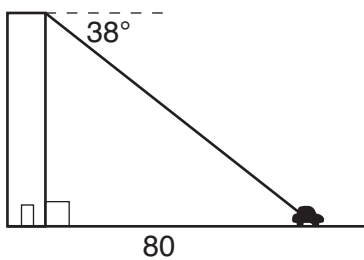
34 Graph and label the functions $y = |x|$ and $y = |2x|$ on the set of axes below.



Explain how increasing the coefficient of x affects the graph of $y = |x|$.

35 Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the *nearest thousandth*.

36 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the *nearest tenth of a foot*.

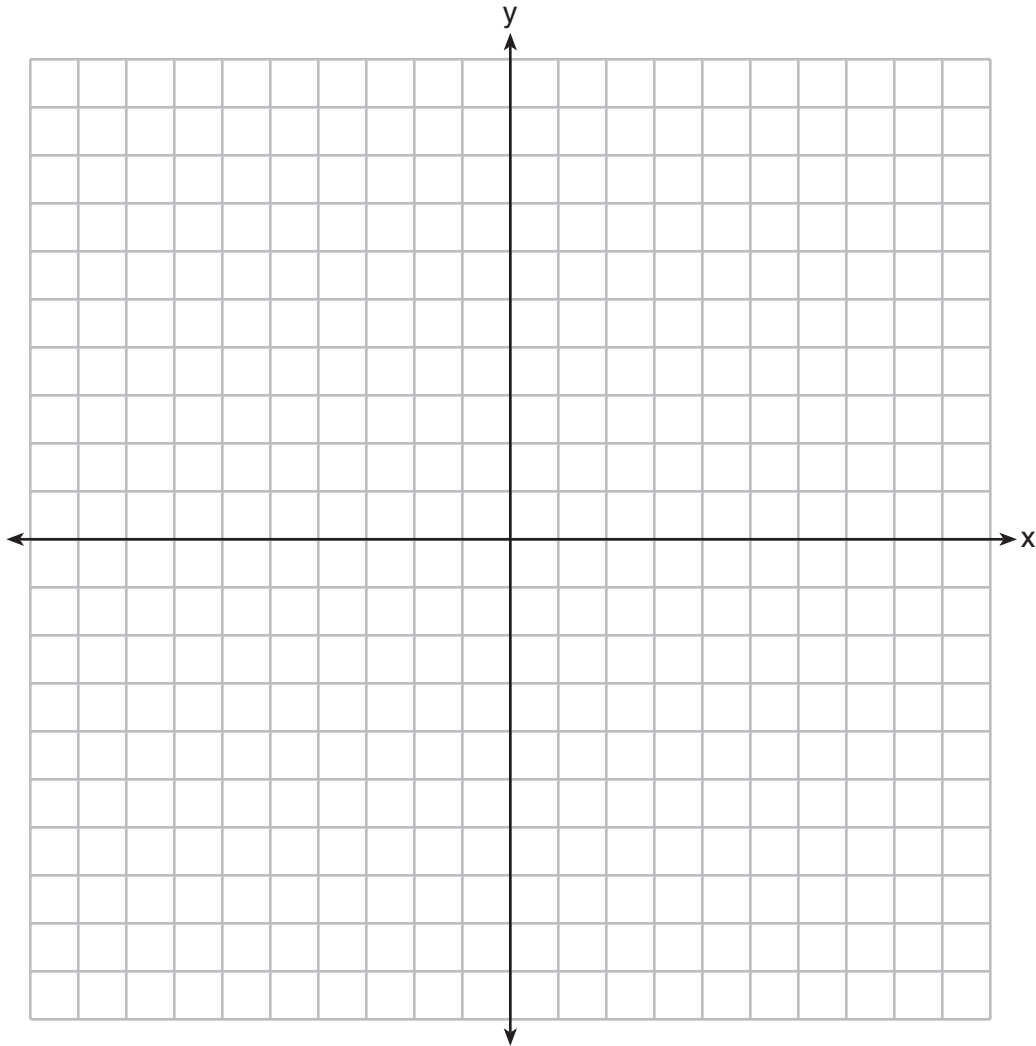


Part IV

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

37 On the set of axes below, solve the following system of equations graphically for all values of x and y . State the coordinates of all the solutions.

$$y = x^2 + 4x - 5$$
$$y = 2x + 3$$



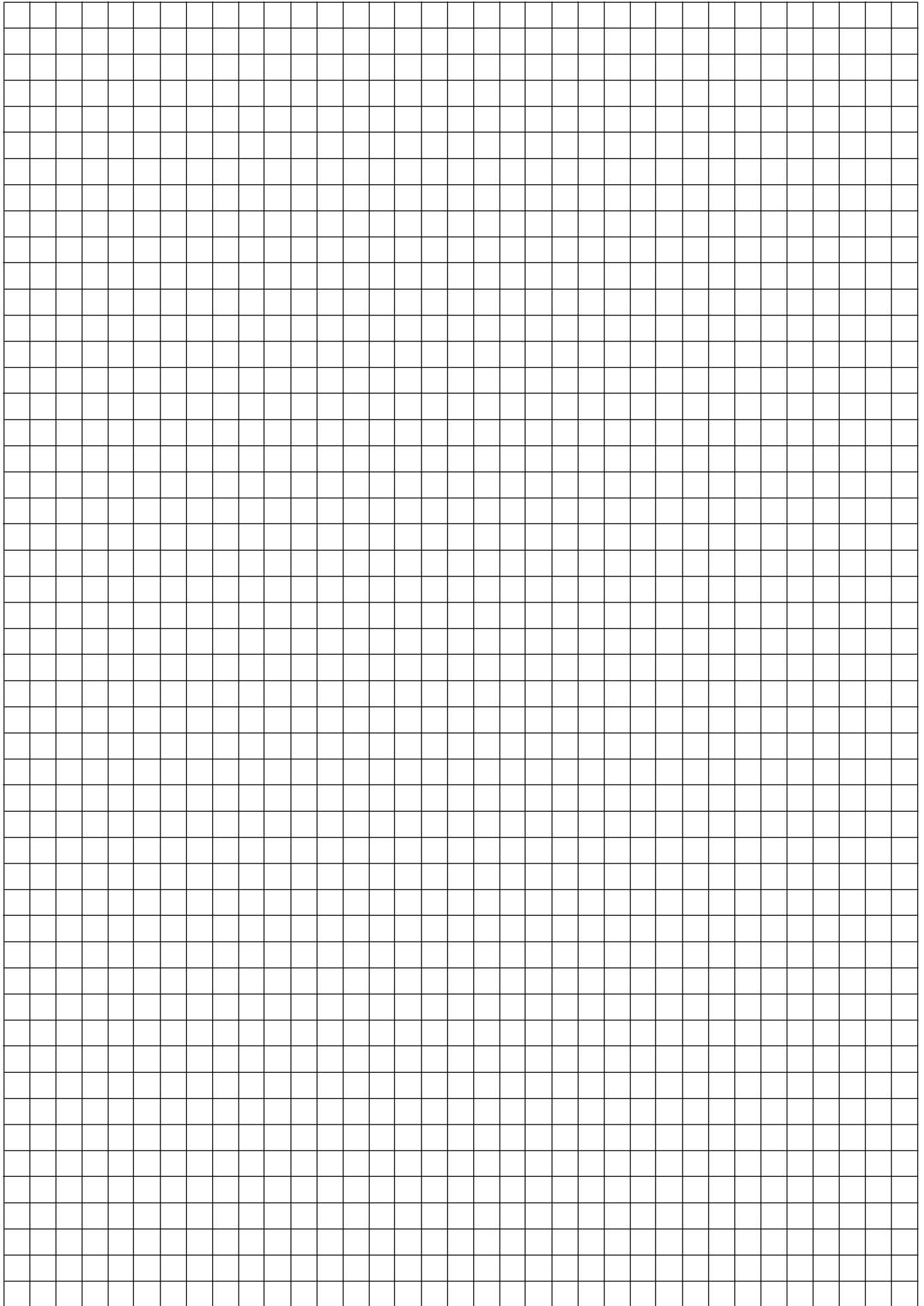
38 Solve algebraically for all values of x : $\frac{3}{x+5} = \frac{2x}{x^2-8}$

39 Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket.

Find the number of Doug's outfits that consist of a cap and a jacket that are different colors.

On Spirit Day, Doug wants to wear either green or white, his school's colors. Find the number of his outfits from which he can choose.

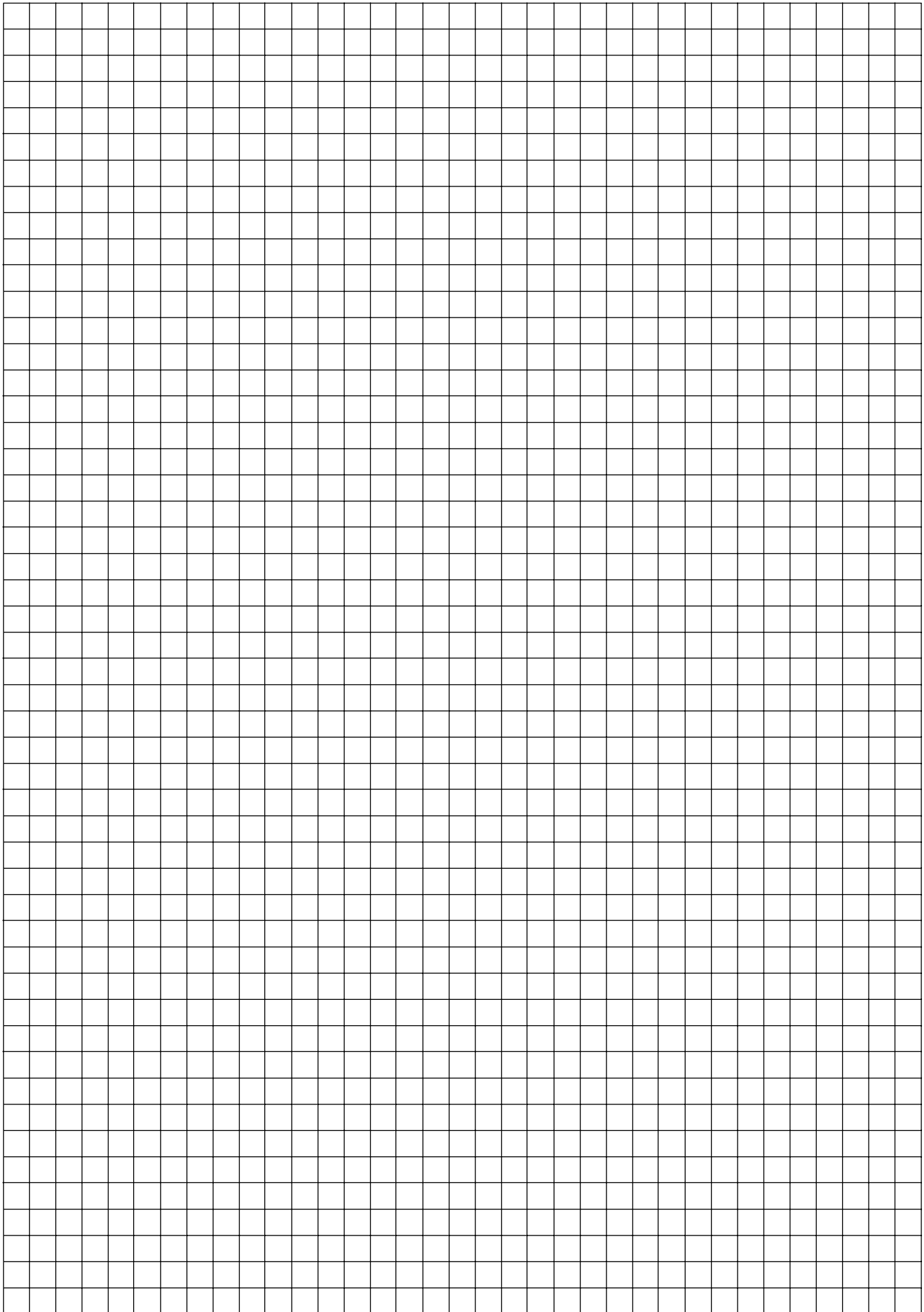
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Trigonometric Ratios

$$\sin A = \frac{\textit{opposite}}{\textit{hypotenuse}}$$

$$\cos A = \frac{\textit{adjacent}}{\textit{hypotenuse}}$$

$$\tan A = \frac{\textit{opposite}}{\textit{adjacent}}$$

Area

trapezoid $A = \frac{1}{2}h(b_1 + b_2)$

Volume

cylinder $V = \pi r^2 h$

Surface Area

rectangular prism $SA = 2lw + 2hw + 2lh$

cylinder $SA = 2\pi r^2 + 2\pi rh$

Coordinate Geometry

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

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