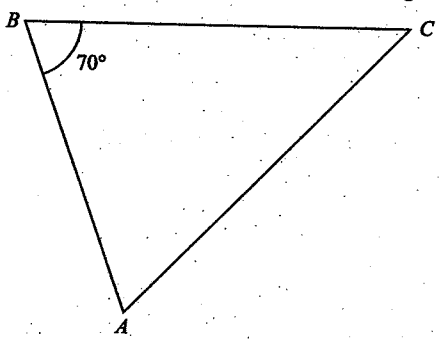
MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each of the problems in the time allowed, then fill in the corresponding bubble on your answer sheet (page 139). Do not spend too much time on any one problem; skip the more difficult problems and go back to them later. You may use a calculator on this test. For this test you should assume that figures are NOT necessarily drawn to scale, that all geometric figures lie in a plane, and that the word *line* is used to indicate a straight line.

DO YOUR FIGURING HERE.

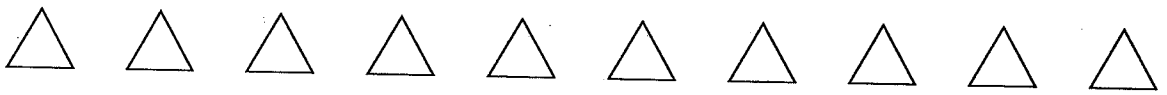
1. In triangle ABC below, the measure of angle B is 70 degrees, and the measure of angle A is half the measure of angle B. What is the measure of angle C?



A. 65°
B. 70°
C. 75°
D. 80°
E. 85°

2. Twenty-one (21) students agreed to contribute an equal amount of money to buy a gift for their teacher. If a total of $70.40 was collected after 16 students paid their shares, what was the total price of the gift?
F. $54.40
G. $92.40
H. $188.00
J. $1,126.40
K. $1,478.40

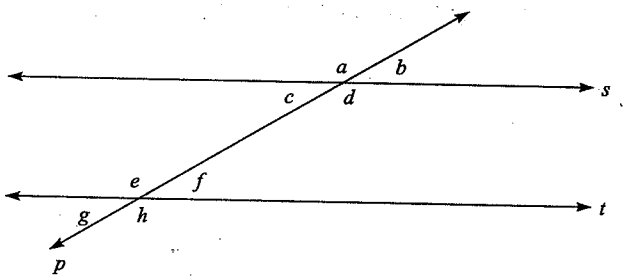
3. The minimum fine for driving in excess of the speed limit is $25. An additional $6 is added to the minimum fine for each mile per hour (mph) in excess of the speed limit. Omar was issued a $103 fine for speeding in a 55-mph speed limit zone. For driving at what speed, in mph, was Omar fined?
A. 13
B. 52
C. 62
D. 68
E. 72



4. In a circuit, $E = IR$, where E = number of volts, I = number of amperes, and R = number of ohms. How much resistance, in ohms, does a circuit possess if the number of volts is 24 and the current is 8 amperes?
   F. 2
   G. 3
   H. 4
   J. 24
   K. 32

DO YOUR FIGURING HERE.

5. In the figure below, line s is parallel to line t, and line p is a transversal crossing both lines s and t. Which of the following lists 3 angles that are equal in measure?



   A. angle a, angle b, angle c
   B. angle a, angle c, angle d
   C. angle a, angle c, angle f
   D. angle a, angle d, angle e
   E. angle b, angle d, angle e

6. In scientific notation, 75,600,000 + 300,000 = ?
   F. 7.59×10^6
   G. 7.6×10^6
   H. 7.59×10^7
   J. 7.6×10^7
   K. 7.86×10^6

7. $\frac{35.65}{0.05} = ?$
   A. 0.713
   B. 7.13
   C. 71.30
   D. 713.0
   E. 7,130.0

8. What is the slope of the line that is perpendicular to the line given by the equation $3y + 6x = -5$?
   F. -2
   G. $\frac{-5}{3}$
   H. $\frac{-1}{2}$
   J. $\frac{1}{2}$
   K. 3

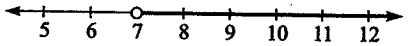
9. If $x = -4$, then $24 + 3 - x^2$?
   A. 11
   B. 25
   C. 29
   D. 31
   E. 43

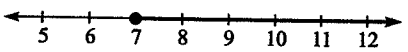
10. A pair of shoes that originally costs $75.00 is on sale at 40% off. If the sales tax on the shoes is 7% of the purchase price, how much would it cost to buy the pair of shoes at the sale price?

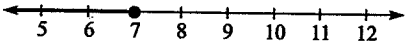
F. $33.15
G. $40.00
H. $42.90
J. $45.00
K. $48.15

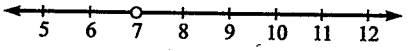
DO YOUR FIGURING HERE.

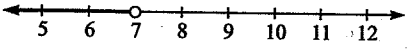
11. Which of the following graphs represents $x > 7$?

A.


B.


C.


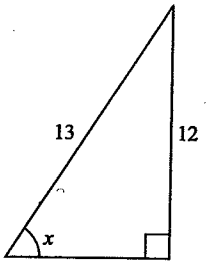
D.


E.


12. If the ratio of $2p$ to $11r$ is 1 to 6, what is the ratio of $6p$ to $11r$?

F. 1 to 18
G. 3 to 6
H. 3 to 33
J. 1 to 6
K. 3 to 22

13. Which of the following equations could be used to determine the value of x?



A. $13 \sin x = 5$
B. $12 \tan x = 5$
C. $12 \cos x = 13$
D. $5 \tan x = 12$
E. $\frac{\cos x}{5} = 12$

14. A rectangular soccer field has an area of 4,500 square meters. The length of the field is 10 meters more than twice the width. Which of the following equations could be used to find the width, w, in feet, of the soccer field?

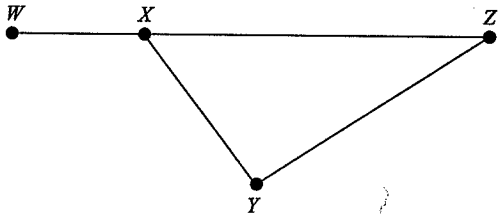
F. $w^2 = 4{,}500 - 10w$
G. $2(w + 10) + w = 4{,}500$
H. $w + 10(2w) = 4{,}500$
J. $w(2w + 10) = 4{,}500$
K. $w(w^2 + 10) = 4{,}500$

15. While riding his bike at a rate of 14 miles per hour (mph), Alan takes 1.20 hours to ride the entire length of a trail. How many hours would it take him to complete the same ride if he rode at 8 mph?
    A. 1.40
    B. 1.75
    C. 2.10
    D. 2.55
    E. 9.60

16. Last year on his vegetable farm, Phil planted carrots in a square-shaped plot, with sides measuring 18 feet. This year, he changed this plot into a rectangular design with the same area as the original square section. If the new width of this section is 12 feet, what is its length, in feet?
    F. 18
    G. 21
    H. 27
    J. 30
    K. 36

17. An apartment complex has 30 apartments that each rent for $320 per month. If 70% of the apartments are rented for 6 months, how much rent will be charged in total for those apartments for the 6 months?
    A. $6,720
    B. $9,600
    C. $22,450
    D. $40,320
    E. $57,600

18. In the figure below, W, X, and Z are collinear. If the measure of angle Y is 87° and the measure of angle YXW is 128°, what is the measure of angle Z?



    F. 35°
    G. 41°
    H. 52°
    J. 78°
    K. 139°

19. What is the value of x in the solution for the system of equations below?

$$-2x + 3y = 30$$

$$4x - \frac{1}{4}y = -14$$

    A. −27
    B. −16
    C. −9
    D. −4
    E. −3

DO YOUR FIGURING HERE.

DO YOUR FIGURING HERE.

20. $\left(\frac{1}{2} \times \frac{3}{5}\right) + \frac{5}{6} - \left(\frac{1}{3} \div \frac{5}{8}\right) = ?$

F. $\frac{1}{8}$

G. $\frac{2}{5}$

H. $\frac{8}{15}$

J. $\frac{3}{5}$

K. $\frac{9}{10}$

21. For all x, $-5x(x-2) - (4x - 7x^2) + (-3x) = ?$

A. $-12x^2 - 11x$
B. $-12x^2 + 9x$
C. $2x^2 + 3x$
D. $2x^2 + 9x$
E. $12x^2 + 11x$

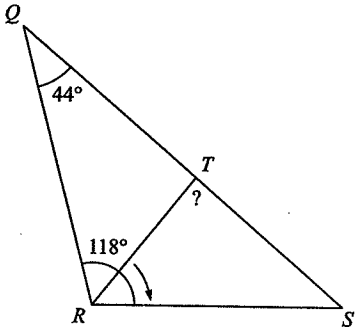
22. 4^{-3} is equivalent to:

F. 64
G. 12
H. $\frac{1}{64}$
J. -4
K. -64

23. If $x = \frac{5}{2}$ is one solution of the equation $2x^2 + kx - 20 = 0$, what is the value of k?

A. -5
B. -3
C. 2
D. 3
E. 8

24. In triangle QRS shown below, $\overline{RT}$ bisects angle QRS. The measure of angle QRS is 118° and angle Q measures 44°. What is the measure of angle RTS?



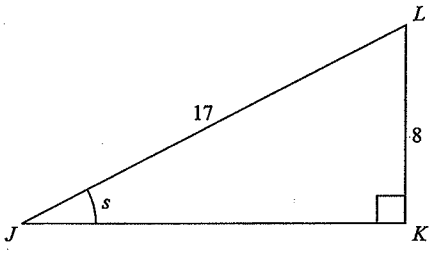
F. 77°
G. 90°
H. 103°
J. 109°
K. 118°

DO YOUR FIGURING HERE.

25. Emily wants to enclose an area of her backyard for her dogs. She has 52 feet of fencing. The width of the enclosed area can be between 9 and 12 feet. If she wants to use all of the fencing, what are the possible dimensions for the length of the enclosed area, in feet?
A. Between 13 and 15
B. Between 14 and 17
C. Between 28 and 34
D. Between 40 and 43
E. All of the fencing cannot be used.

26. The volume, V, of a sphere is determined by the formula $V = \frac{4\pi r^3}{3}$, where r is the radius of the sphere. What is the volume, in cubic centimeters, of a sphere with a diameter 12 centimeters long?
F. 144π
G. 288π
H. 360π
J. 576π
K. $2{,}304\pi$

27. In the figure below, angle K is a right angle, $\overline{JL}$ is 17 inches long, and $\overline{KL}$ is 8 inches long. If the measure of angle J is s, then $\tan s = ?$



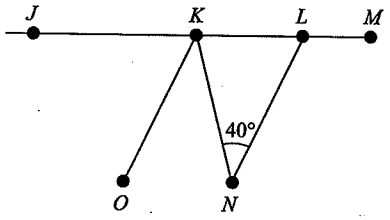
A. $\frac{17}{8}$
B. $\frac{17}{15}$
C. $\frac{15}{17}$
D. $\frac{8}{15}$
E. $\frac{8}{17}$

28. What is the sum of all the solutions of the equation $\frac{5x+4}{2x} = \frac{x+5}{x}$?
F. -2
G. 0
H. 2
J. 4
K. 6

29. $|-7| - 2|-6| = ?$
A. 19
B. 5
C. 2
D. -5
E. -19

DO YOUR FIGURING HERE.

30. In the figure below, $\overline{KO}$ is parallel to $\overline{LN}$; points J, K, L, and M are collinear; and $\overline{KN}$ is the same length as $\overline{LN}$. If the measure of angle LNK is 40°, what is the measure of angle JKO?



F. 100°
G. 70°
H. 55°
J. 40°
K. 25°

31. If $2a^2 - 5 \leq 67$, what is the smallest real value a can have?
A. 36
B. 12
C. -6
D. -12
E. There is no smallest value for a.

32. The length of one side of a square is 11 units. What is the length, in units, of the diagonal of the square?
F. $22\sqrt{2}$
G. $\sqrt{22}$
H. $11\sqrt{3}$
J. $11\sqrt{2}$
K. 11

33. What is the radius of a circle in the standard (x, y) coordinate plane with an equation of $(x + 9)^2 + (y + 7)^2 = 64$?
A. 64
B. 32
C. 16
D. 12
E. 8

34. What is the slope of the line determined by the equation $-12x - 3y = 17$?
F. -4
G. $\frac{-1}{3}$
H. $\frac{1}{3}$
J. 4
K. $\frac{17}{3}$

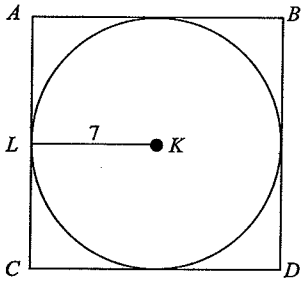
DO YOUR FIGURING HERE.

35. In a local basketball league, teams must have at least six players but no more than ten. There are 25 teams in the league, and the number of persons on each team varies as shown in the chart below. What is the average number of persons per team, to the nearest whole number, for these 25 teams?

Number of players on team	6	7	6	9	10
Number of teams	3	6	4	9	3

A. 5
B. 6
C. 7
D. 8
E. 9

36. In the figure below, the circle centered at K is contained within the square $ABCD$. The length of $\overline{KL}$ is 7 inches. If the circle is cut out of the square, how much of the area, in square inches, of the square, will remain?



F. $196 - 49\pi$
G. $196 - 14\pi$
H. 14π
J. 49π
K. $196 + 14\pi$

37. What is the equation of the line that has the same slope as the line $2x - 8y = 13$ but with the same y-intercept as the line $y + 5 = -3x$?

A. $y = -3x - \frac{13}{8}$

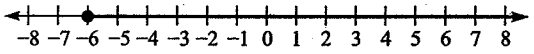
B. $y = -\frac{1}{4}x + 5$

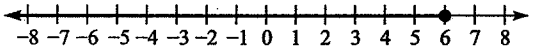
C. $y = \frac{1}{4}x - 5$

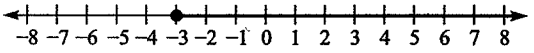
D. $y = 2x + \frac{13}{8}$

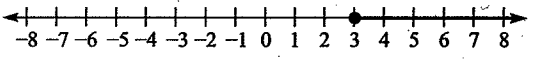
E. $y = 3x - 5$

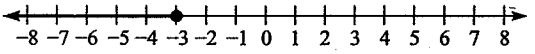
38. Which of the following represents the solution set of the inequality $4x + 2 \geq 7x + 11$?

F.


G.


H.


J.


K.


39. What is the value of s if the line in the standard (x, y) coordinate plane that passes through the points $(3s, 16)$ and $(2s, 6)$ has slope $-\frac{5}{2}$?

A. -11
B. -4
C. 0
D. 4
E. 11

40. The formula for calculating simple interest is $I = Prt$, where I is the number of dollars of interest paid, P is the initial amount borrowed (principal), r is the fixed annual interest rate, and t is the time, in years, of the loan. To buy a computer, Trey took out a loan that was repaid over two years at an annual interest rate of 11%. If Trey paid \$308 total in interest, how much did he originally borrow?

F. \$3,388
G. \$2,250
H. \$1,400
J. \$1,025
K. \$616

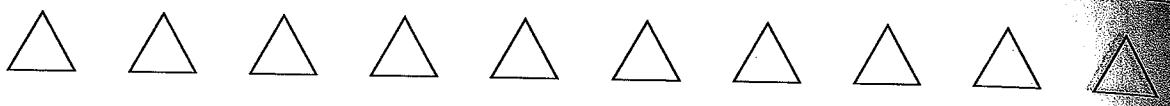
41. Three vertices of a rectangle in the standard (x, y) coordinate plane have coordinates $(-5, -1)$, $(6, 2)$, and $(6, -1)$. What are the coordinates of the fourth vertex?

A. $(-6, -1)$
B. $(-2, -6)$
C. $(-5, -1)$
D. $(2, -1)$
E. $(2, 0)$

42. If $\sqrt{4x} - 2 = 6$, then $x =$?

F. 4
G. 8
H. 16
J. 24
K. 32

DO YOUR FIGURING HERE.



DO YOUR FIGURING HERE.

43. Eugenia used a calculator to add up her monthly expenses. When trying to multiply a number, Z, by 4, she accidentally multiplied it by 7, and her result was 39 more than the correct value. Which of the following equations would correctly determine Z?

A. $7Z - 39 = 4Z$

B. $7Z + 4Z = 39$

C. $7Z = 4Z - 39$

D. $\frac{7 - 39}{Z} = \frac{4}{Z}$

E. $\frac{7}{Z} + 39 = \frac{4}{Z}$

44. What is the sum of all the values of x that satisfy the equation $3x^2 - 15x - 42 = 0$?

F. 9
G. 5
H. 2
J. -5
K. -9

45. If the first term in an arithmetic series is 5, the last term is 159, and the sum is 1,230, what are the 2nd, 3rd, and 4th terms?

A. 10, 15, 20

B. 16, 27, 38

C. 20, 35, 50

D. $43\frac{1}{2}$, 82, 159

E. 126, 137, 148

46. Student tickets for a volleyball game cost \$3 each and nonstudent tickets cost \$5 each. A total of \$360 worth of tickets were sold. If S represents the number of student tickets sold, which of the following is a general formula for the total number of dollars collected from the sales of nonstudent tickets?

F. $3S + 360$
G. $5S + 360$
H. $8S - 360$
J. $15S$
K. $360 - 3S$

47. Which of the following represents the values of x that are solutions for the inequality $(x + 7)(8 - 2x) \geq 0$?

A. $x \leq -7$ or $x \geq 4$

B. $x \leq -4$ or $x \geq 7$

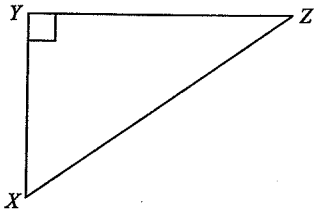
C. $\frac{1}{7} \leq x \leq \frac{1}{4}$

D. $-4 \leq x \leq 7$

E. $-7 \leq x \leq 4$

48. In the figure below, angle Y is a right angle, and the measure of angle X is 45°. What is the ratio of the length of $\overline{YZ}$ to the length of $\overline{XZ}$?

DO YOUR FIGURING HERE.



F. $\frac{1}{\sqrt{3}}$

G. $\frac{1}{\sqrt{2}}$

H. $\frac{\sqrt{2}}{\sqrt{3}}$

J. $\frac{\sqrt{2}}{1}$

K. $\frac{\sqrt{3}}{1}$

49. If $\tan\theta = \frac{6}{-8}$ and $0° \leq \theta \leq 180°$, then $\cos\theta = ?$

A. $\frac{10}{8}$

B. $\frac{6}{10}$

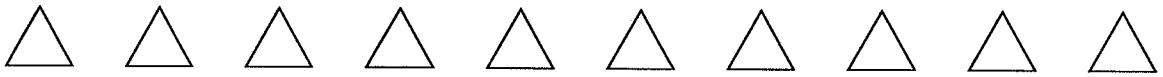
C. $\frac{-8}{10}$

D. $\frac{-10}{8}$

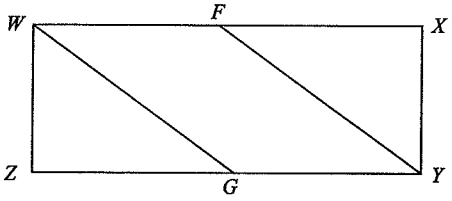
E. $\frac{-10}{6}$

50. At George Washington High School, 65% of this year's senior class members have taken at least 6 science courses. Of the remaining class members, 40% have taken 4 or 5 science courses. Assuming no seniors took more than 6 science courses, what percent of the senior class members have taken fewer than 4 science courses?

F. 0%
G. 8%
H. 14%
J. 21%
K. 35%



51. In the figure below, rectangle $WXYZ$ has sides with length of 12 units and width of 4 units. Also, F and G are midpoints of $\overline{WX}$ and $\overline{YZ}$, respectively. What is the perimeter, in units, of quadrilateral $WFYG$?

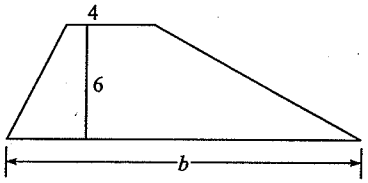


A. $8+6\sqrt{15}$
B. $12+4\sqrt{13}$
C. $12+4\sqrt{15}$
D. $16\sqrt{13}$
E. 40

DO YOUR FIGURING HERE.

52. A line in the standard (x, y) coordinate plane has slope $\frac{3}{2}$ and goes through the point $(-3, -2)$. If the point with coordinates $(a, 7)$ is on the line, then $a = ?$
F. -9
G. -3
H. 3
J. 5
K. 9

53. The area of the trapezoid below is 54 square inches, the height is 6 inches, and the length of one base is 4 inches. What is the length, b, in inches, of the other base?

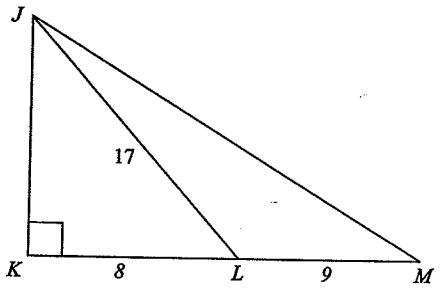


A. 5
B. 7
C. 10
D. 14
E. 18

54. Which of the following inequalities characterizes the values of a for which the inequality $5a - 13 \geq -3a + 19$ is true?
F. $a \leq 4$
G. $a \leq 16$
H. $a \geq -4$
J. $a \geq 4$
K. $a \geq 16$

55. In the figure below, the lengths of $\overline{KL}$, $\overline{JL}$, and $\overline{LM}$ are given, in inches. What is the area, in square inches, of triangle JML?

DO YOUR FIGURING HERE.

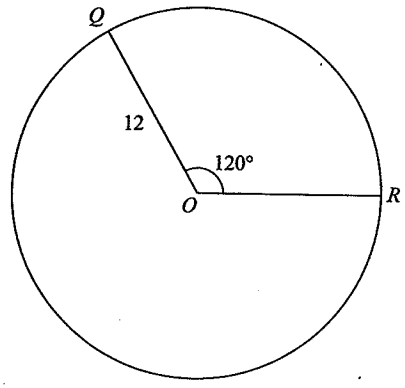


A. 28.6
B. 35
C. 67.5
D. 127.5
E. 135

56. Which of the following intervals contains the solution to the equation $-x + 7 = \frac{2x - 19}{3}$?

F. $6 < x \leq 7$
G. $7 < x \leq 8$
H. $11 < x \leq 12$
J. $16 < x \leq 17$
K. $20 < x \leq 21$

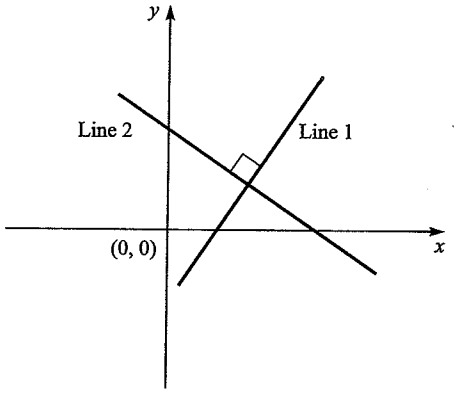
57. In the figure below, Q and R lie on the circle centered at O, $\overline{OQ}$ is 12 units long, and the measure of angle QOR is 120°. How many units long is minor arc QR?



A. 2π
B. 4π
C. 8π
D. 16π
E. 24π

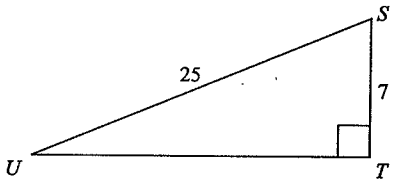
7 △ △ △ △ △ △ △ △ 7

58. Given the graph in the standard (x, y) coordinate plane below, which of the following statements is true about the slopes m_1 and m_2 of line 1 and line 2, respectively?



F. $m_1 = \frac{-1}{m_2}$
G. $m_1 = -m_2$
H. $m_1 = \frac{1}{2m_2}$
J. $m_1 = m_2$
K. $m_1 = 2m_2$

59. In the right triangle below, the length of $\overline{ST}$ is 7 inches and the length of $\overline{SU}$ is 25 inches. What is the cosine of angle U?



A. $\frac{7}{25}$
B. $\frac{24}{25}$
C. $\frac{25}{24}$
D. $\frac{24}{7}$
E. $\frac{25}{7}$

60. Point $M(3, -7)$ is in the standard (x, y) coordinate plane. What must be the coordinates of point N so that the line $y = -3$ is the perpendicular bisector of $\overline{MN}$?
F. (1, −7)
G. (3, −9)
H. (3, −5)
J. (3, −3)
K. (3, 1)

DO YOUR FIGURING HERE.

END OF THE MATHEMATICS TEST
STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY.