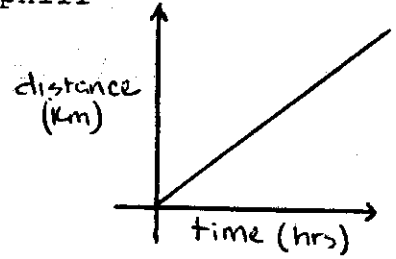
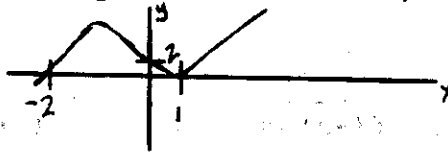


1989 NATIONAL MATHEMATICS
 GRAPHS TEST (THETA ONLY)

- 1) The graph relating the distance a car travels to the time taken is a straight line as shown. The graph indicates that the car is:
 a) speeding up b) slowing down c) travelling uphill
 d) travelling at a constant speed e) nota

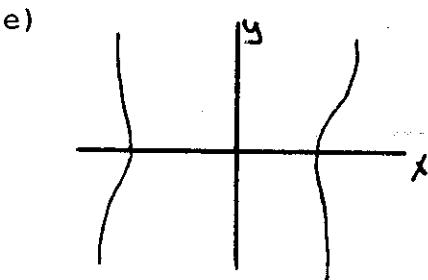
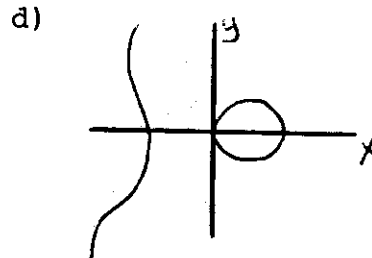
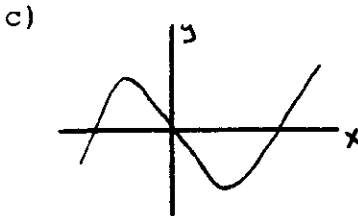
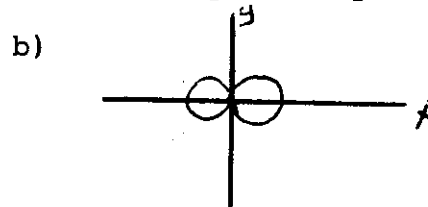
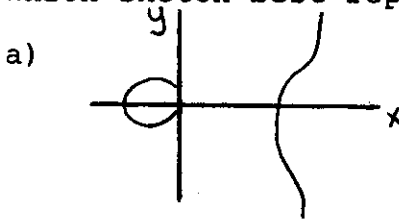


- 2) If, in the diagram, the graph represents a cubic, then the equation of the graph is:

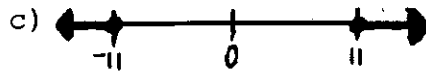
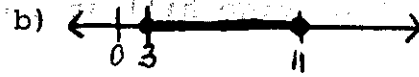


- a) $y = (x+1)^2(x-2)$ b) $y = (x+1)^2(2-x)$ c) $y = -(x-1)^2(x+2)$
 d) $y = (x-1)^2(x+2)$ e) nota

- 3) Which sketch best represents the graph of the equation $y^2 = x(x^2 - 1)$?



4) Which graph below represents the solution to: $|x-7| \geq 4$?

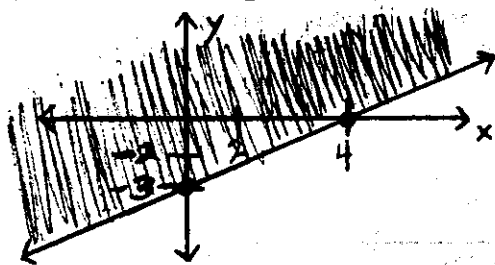


e) nota

5) The set of points satisfying the pair of inequalities $y \geq 2x+1$ and $x \leq -2$ is contained entirely in quadrants:

- a) I and II b) II and III c) III and IV d) I and III
e) nota

6) Which inequality is shown by the graph below?

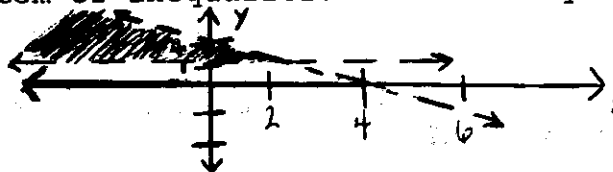


- a) $3x-4y < 12$
b) $3x-4y \leq 12$
c) $3x-4y > 12$
d) $3x-4y \geq 12$
e) nota

7) The temperature of dry air is a linear function of the altitude. Suppose that the temperature at an altitude of 1000 meters is 10°C and at an altitude of 2500 meters is -5°C . Which of the following is an equation for the temperature C in degrees Celsius in terms of the altitude a in meters?

- a) $C = -0.01a + 20$ b) $C = 0.01a + 20$ c) $C = -0.01a$
d) $C = 0.01a$ e) nota

8) Which system of inequalities is shown by the graph below?

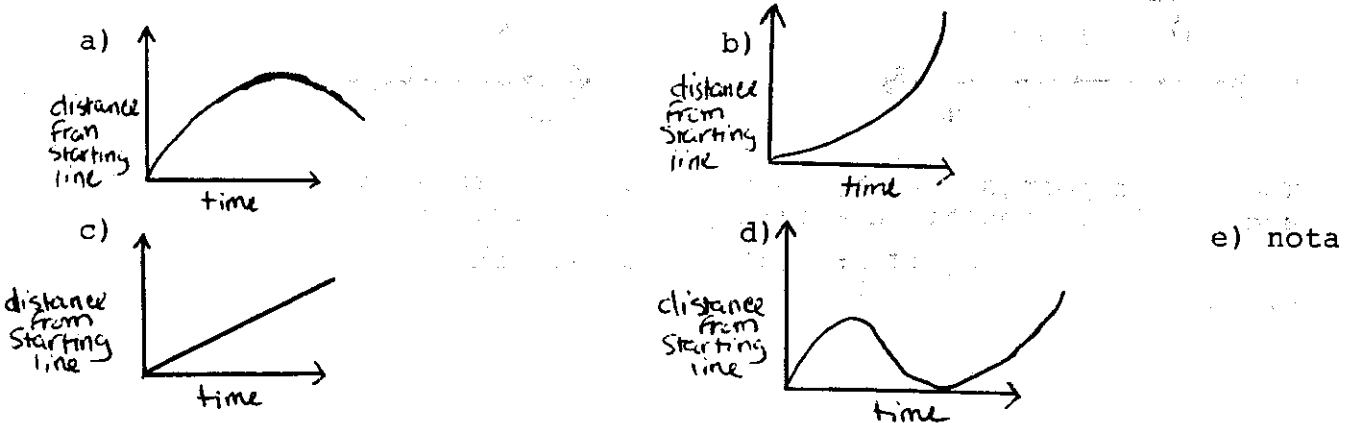


- a) $x+y > 4$ and $y > 1$ b) $x+y > 4$ and $x > 1$ c) $x+y < 4$ and $y > 1$ d) $x+y < 4$ and $x > 1$ e) nota

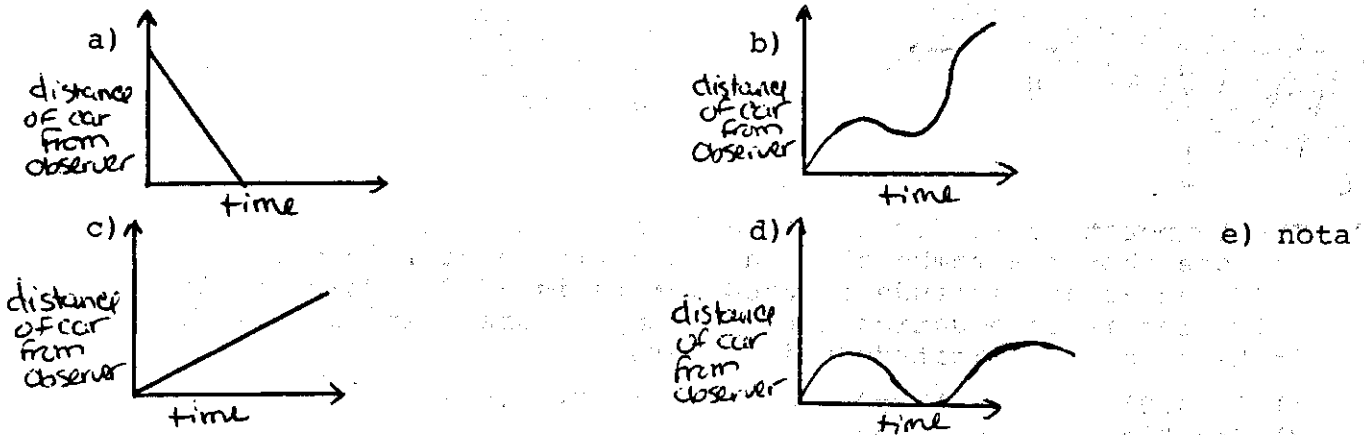
9) Consider the equation $ky+4x=9$. For what value of k will the slope be 1?

- a) 4 b) -4 c) $\frac{1}{4}$ d) $-\frac{1}{4}$ e) nota

10) Which of the following graphs best depicts the distance of a cyclist from the starting line of a race over time if he must travel over a large hill at the beginning of the race?



11) An observer is standing at the intersection of a figure-eight racetrack. A single car is travelling on the track. Which graph best depicts the distance of the car from the observer at any time?



12) Find k if the graph of $xy - 4x + 2y + k = 0$ is a pair of perpendicular lines.

- a) 4 b) -4 c) 8 d) -8 e) nota

13) The vertex of the parabola $y = x^2 - 8x + c$ will be a point on the x-axis if the value of c is what?

- a) 4 b) -4 c) 16 d) -16 e) nota

14) In a rectangular coordinate system whose axes have scales with lcm. as the unit length, triangle ABC has vertex A at (0,3), vertex B at (4,0), and vertex C at (x,5). If $0 < x < 4$, and if the area of the triangular region ABC is 8 square centimeters, find x.

- a) 2 b) $\frac{8}{3}$ c) 3 d) $\frac{10}{3}$ e) nota

15) In the rectangular coordinate plane, find the length of the graph of $|x+y-1| + |x-x| + |x-1| + x-1 = 0$.

- a) $\sqrt{2}$ b) 2 c) $\sqrt{3}$ d) 3 e) nota

16) The only road in Circleland is circular, and all 3 inhabitants of Circleland live on this road. The doctor lives at (4,14), the lawyer lives at (-1,9) and the Indian Chief lives at (8,12). One day, the Indian Chief visited the doctor. Being dissatisfied, he went directly from the doctor to the lawyer, traveling along the road. Find the minimum length of his trip from the doctor to the lawyer.

- a) $\frac{\pi}{2}$ b) $3\frac{\pi}{2}$ c) $5\frac{\pi}{2}$ d) $7\frac{\pi}{2}$ e) nota

17) The real-valued functions f and g are defined by $f(x) = x^2 - x + 1$, $x \geq \frac{1}{2}$ and $g(x) = \frac{1}{2} + \sqrt{x - \frac{1}{4}}$, $x \geq \frac{3}{4}$ and are inverses to each other. Find the coordinates (x,y) of the pt. in the rectangular coordinate system at which the graphs of these 2 functions intersect.

- a) (0,0) b) (1,1) c) $(\frac{3}{2}, \frac{3}{2})$ d) (2,2) e) nota

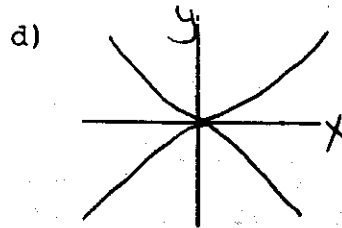
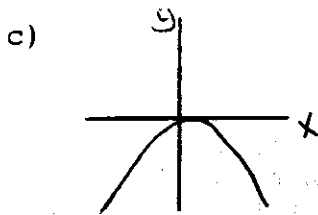
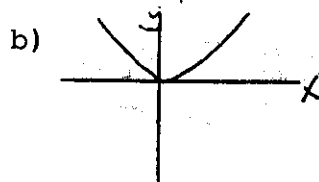
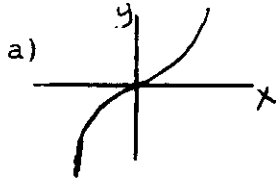
18) Determine the area bounded by the x and y axes, and the line segment whose equation is: $3x+4y=36$.

- a) 54 sq.units b) 108 sq.units c) 9 sq.units d) 12 sq.units
e) nota

19) If a complex number, $a + bi$, is plotted in a coordinate plane as the point (a,b) , then the set of points such that $|a+bi| \leq 1$ is a region whose boundary is what?

- a) 2 parallel lines b) an equilateral triangle c) a square
 d) an ellipse e) nota

20) Which of the following is the graph of $y = |x| \cdot x$?



e) nota

21) Which of the following equations has a graph that is symmetric with respect to the origin?

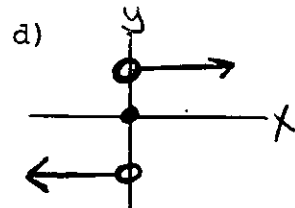
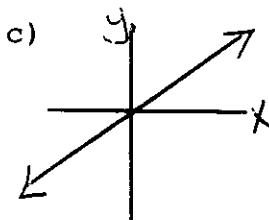
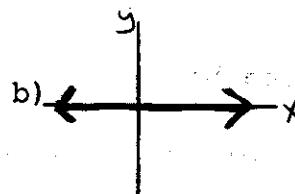
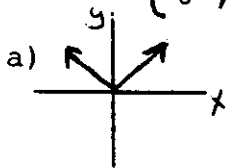
- a) $y = \frac{x+1}{x}$ b) $y = -x^5 + 3x$ c) $y = x^4 - 2x^2 + 6$
 d) $y = (x-1)^3 + 1$ e) nota

22) If the 3 vertices of a square are $(2,4)$, $(7,9)$, and $(2,9)$, then at what point do the diagonals intersect?

- a) $(7,4)$ b) $(\frac{5}{2}, \frac{5}{2})$ c) $(\frac{9}{2}, \frac{13}{2})$ d) $(\frac{7}{2}, 2)$ e) nota

23) Which of the following figures represents the graph of

$$y = f(x) = \begin{cases} \frac{|x|}{x}, & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}$$



e) nota

- 24) One vertex of a triangle is the point $(0,6)$, and one side lies along the x -axis. The area of this triangle is divided into 2 equal parts by the line $y=k$. Find k .
- a) 2 b) 4 c) $6-\sqrt{2}$ d) $6-3\sqrt{2}$ e) nota
- 25) The graph of a quadratic function passes through the points with coordinates $(-1,-2)$, $(1,0)$, $(2,7)$, and $(3,y)$. Find y .
- a) 12 b) -12 c) 18 d) -18 e) nota
- 26) The points $A(-1,4)$ and $B(2,-3)$ are ⁱⁿ a rectangular coordinate system. Point C is on \overline{AB} with $AC:CB=3:4$. Find the coordinates of point C .
- a) $(1, \frac{2}{7})$ b) $(\frac{2}{7}, 1)$ c) $(-1, -\frac{2}{7})$ d) $(-\frac{2}{7}, -1)$ e) nota
- 27) The points $(2,3)$ and $(5,1)$ are reflected over the y -axis. Find the number of square units in the area of the quadrilateral whose vertices are the points and their images.
- a) 7 b) 14 c) 16 d) 28 e) nota
- 28) Points O and P on the graph $x^2=20y-100$ are the centers of circles tangent to both axes. These circles intersect at $(0,k)$. Find k .
- a) 5 b) 10 c) 20 d) 25 e) nota
- 29) In a 3-dimensional coordinate system, find the total surface area of the solid defined by $|x| + |y| + |z| \leq 1$.
- a) 8 b) $\frac{4\pi}{3}$ c) $4\sqrt{3}$ d) 1 e) nota
- 30) If the graph of a line crosses the y -axis at $(0,2)$ and is horizontal, find the value of x where the function crosses the x -axis.
- a) 0 b) 2 c) 4 d) ∞ e) nota