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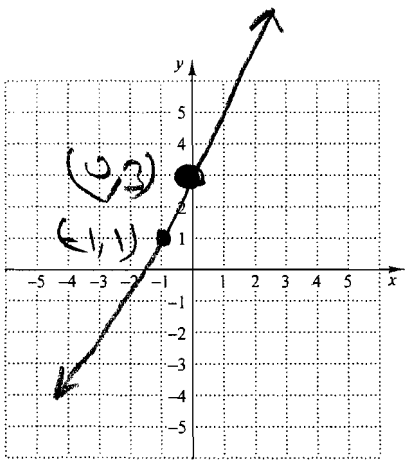
Find an equation of the line having the specified slope and containing the indicated point. Write your final answer as a linear function in slope–intercept form. Then graph the line.

13. $m = 2, (-1, 1)$ **13.**_____

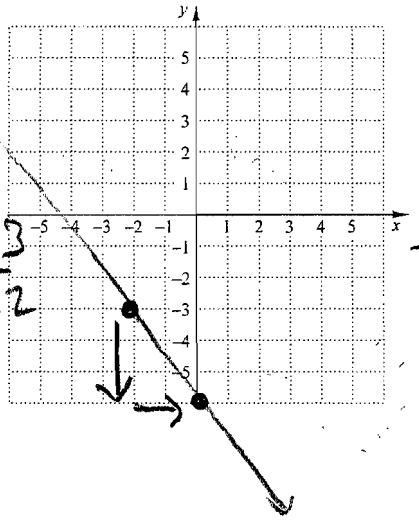


$y = mx + b$

$1 = 2(-1) + b \Rightarrow b = 3$

$y = 2x + 3$

14. $m = -\frac{3}{2}, (-2, -3)$ **14.**_____



$y = mx + b$

$-3 = -\frac{3}{2} \cdot -2 + b$

$-3 = 3 + b$

$-3 \quad -3$

$-6 = b$

$y = -\frac{3}{2}x - 6$

$\frac{-3}{2} = \frac{\text{Down 3}}{\text{over 2}}$

Find an equation of the line containing each pair of points. Write your final answer as a linear function in slope–intercept form

15. (3,6) and (1;3) **15.** $y = \frac{3}{2}x + \frac{3}{2}$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3-6}{1-3} = \frac{-3}{-2} = \frac{3}{2}$

$y = mx + b$

$6 = \frac{3}{2}(3) + b \rightarrow 6 = \frac{9}{2} + b \Rightarrow b = \frac{3}{2}$

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16. $(-0.4, 2)$ and $(1.6, -3)$ **16.** $y = -\frac{5}{2}x + 1$

$m = \frac{-3-2}{1.6-(-0.4)} = -\frac{5}{2}$ $\quad 2 = -\frac{5}{2}(-0.4) + b$

$2 = 1 + b \Rightarrow b = 1$

17. $(-3, 0)$ and $(0, 4)$ **17.**

$m = \frac{4-0}{0-(-3)} = \frac{4}{3}$ $\quad$ ↑ y-intercept

$y = \frac{4}{3}x + 4$

18. $(-5, -7)$ and $(-1, -3)$ **18.**

$m = \frac{-3-(-7)}{-1-(-5)} = \frac{4}{4} = 1$

$y - (-7) = 1(x - (-5)) \Rightarrow y + 7 = x + 5$

$-7 \quad -7$

$\Rightarrow y = x - 2$ $\quad y = 1x - 2$

19. The following table lists the total amount spent on nursing home care in the U.S. for several years. Use the data in the table to draw a graph. Then estimate the amount spent on nursing home care in 1997 and in 2003. **19.**

Year	Total Expenditure, in billions of dollars
1993	65.7
1995	74.6
1999	89.6
2001	98.9

Source: U.S. Bureau of the Census

(1993, 65.7)

(2001, 98.9)

$m = \frac{98.9 - 65.7}{2001 - 1993} = 4.15$

$y = mx + b$

$65.7 = 4.15(1993) + b$

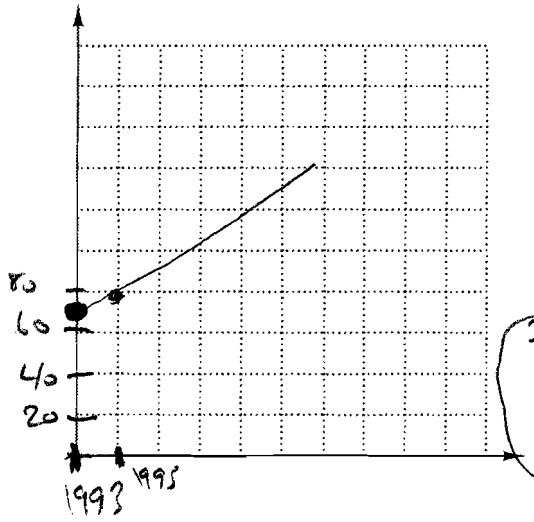
$-8205.25 = b$

$y = 4.15x - 8205.25$ ← $x = 1997$

In 1997 $\Rightarrow y = 82.3$ Billions of $

In 2003 $\Rightarrow y = 4.15(2003) - 8205.25$

$= 107.2$ Billions of $



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In Exercises 20 and 21, assume that a constant rate of change exists for each model formed.

20. In 1992, 1250 students attended Eastside College. By 2007, the college had 1425 students. Let $c(t)$ represent the number of students at the college t years after 1992.
a) Find a linear function that fits the data.
b) Use the function of part (a) to predict the number of students in 2010.
c) When will 1600 students attend Eastside College?

20.(a) $c(t) = \frac{35}{3}t + 1250$

(b) 1460 students

(c) year 2022

t #of students

(0, 1250)
(15, 1425)

$m = \frac{1425-1250}{15-0} = \frac{35}{3}$

(a) $c(t) = \frac{35}{3}t + 1250$

$2010 - 1992 \Rightarrow t = 18$ (b) $c(18) = \frac{35}{3}(18) + 1250 = 1460$

(c) $1600 = \frac{35}{3}t + 1250 \Rightarrow t = 30$

30 + 1992 = 2022

21. In 1985, the record for the 100-m run at Eastside College was 12.3 sec. In 2005, it was 12.1 sec. Let $r(t)$ represent the record in the 100-m run and t the number of years since 1985.
a) Find a linear function that fits the data.
b) Use the function of part (a) to predict the record in 2000 and in 2010.
c) Find the year when the record will be 12.0 sec.

21.(a) $r(t) = -0.01t + 12.3$

(b) 12.15 sec; 12.05 sec

(c) year 2015

(t, rate)

1985 (0, 12.3)
2005 (20, 12.1)

$\Rightarrow m = \frac{12.1-12.3}{20-0} = -0.01$

$y = mx + b \Rightarrow y = -0.01x + 12.3$

$r(t) = -0.01t + 12.3$

b) year 2000 $\Rightarrow t = 2000 - 1985 = 15$ $r(15) = -0.01(15) + 12.3 = 12.15$ sec

year 2010 $\Rightarrow t = 2010 - 1985 = 25$ $r(25) = -0.01(25) + 12.3 = 12.05$ sec

c) $12.0 = -0.01t + 12.3 \Rightarrow t = 30 \Rightarrow$ year $= 1985 + 30 = 2015$

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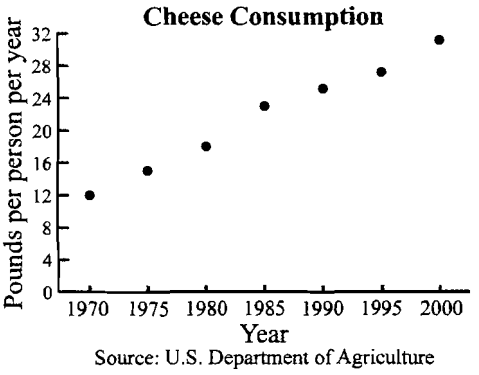
Determine whether the data in each graph appear to be linear.

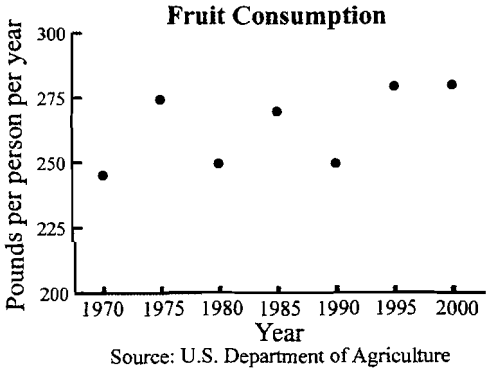
22.



Source: U.S. Department of Agriculture

22. Linear

23.



Source: U.S. Department of Agriculture

23. Not Linear

24. The following table lists Medicaid payments to nursing homes for several years.

Year	Medicaid payments, in billions of dollars
1990	23.2
1993	32.4
1997	39.6
2001	47.0

Source: U.S. Bureau of the Census

a) Use linear regression to find a linear function that can be used to predict Medicaid payments M to nursing homes as a function of the number of years x after 1990.

b) Estimate the amount of Medicaid payments to nursing homes in 2005.

24.(a) $y = 2.16x - 4275.2$

(b) $y = \$55.6$ Billion

$(1990, 23.2)$ $m = \frac{23.8}{11} = 2.16$

$(2001, 47.0)$

$y - 23.2 = 2.16(x - 1990)$

(a) $y = 2.16x - 4275.2$

(b) $y = 2.16(2005) - 4275.2$

$y = 55.6$