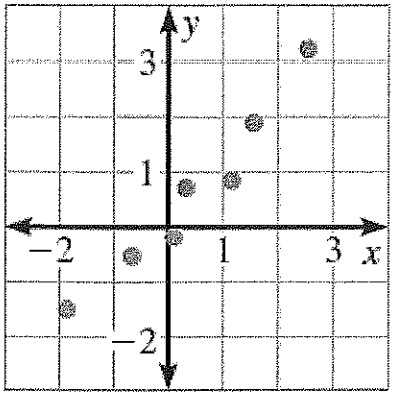
4.5B HW Worksheet – Predicting with Linear Models **Name:** _____

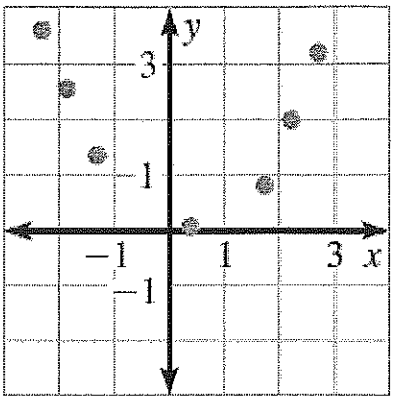
Algebra I

Tell whether it is reasonable for the graph to be represented by a linear model.

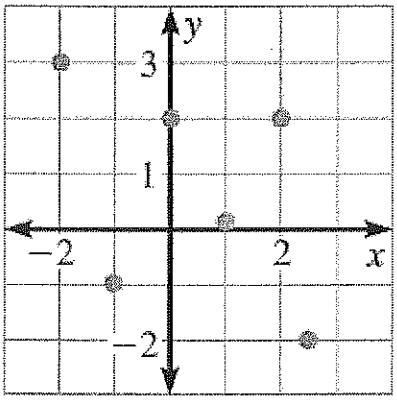
1.



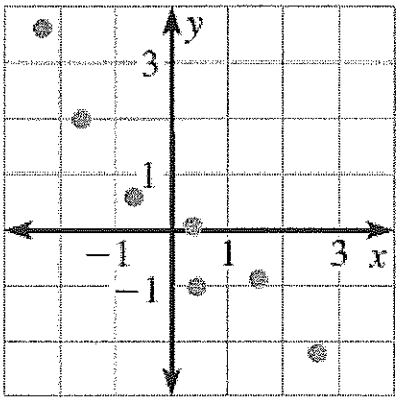
2.



3.



4.



Let $y = 4.2x + 7.1$ represent a company's profit, in thousands of dollars, from 1985 to 2010. Let x represent the number of years since 1985.

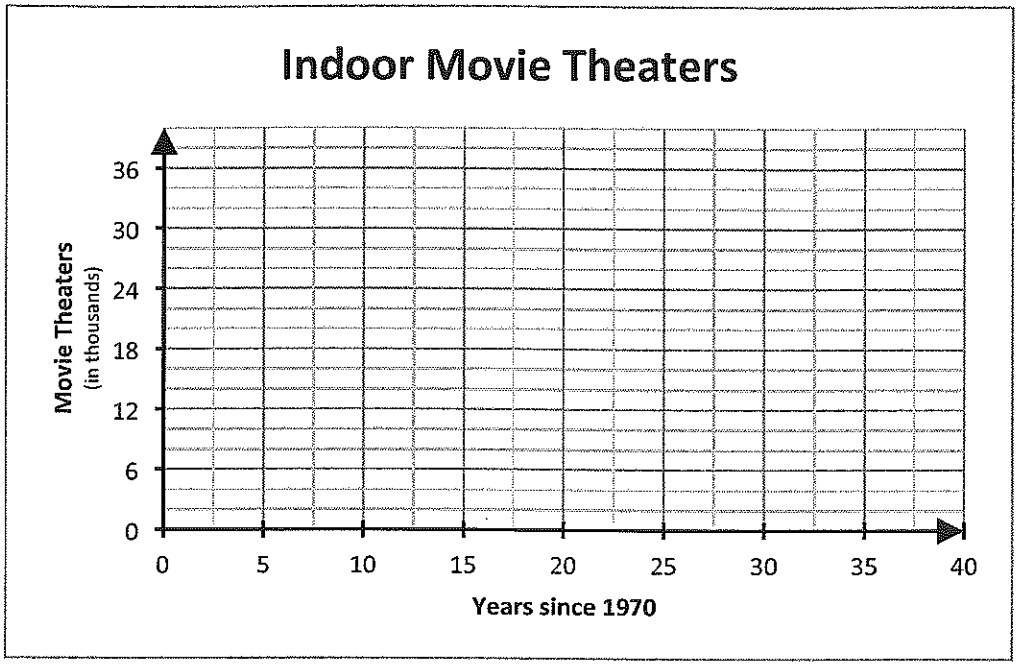
5. Use linear interpolation to predict the profit of the company for 1997.

6. Use linear extrapolation to predict the profit of the company for 2011.

In exercises 7 – 10, use the table which shows the number of indoor movie theater screens (in thousands) from 1975 to 2005.

Year	1975	1980	1985	1990	1995	2000	2005
Indoor Movie Theaters (in thousands)	11	14	18	23	27	30	36

7. Make a scatter plot of the given data.



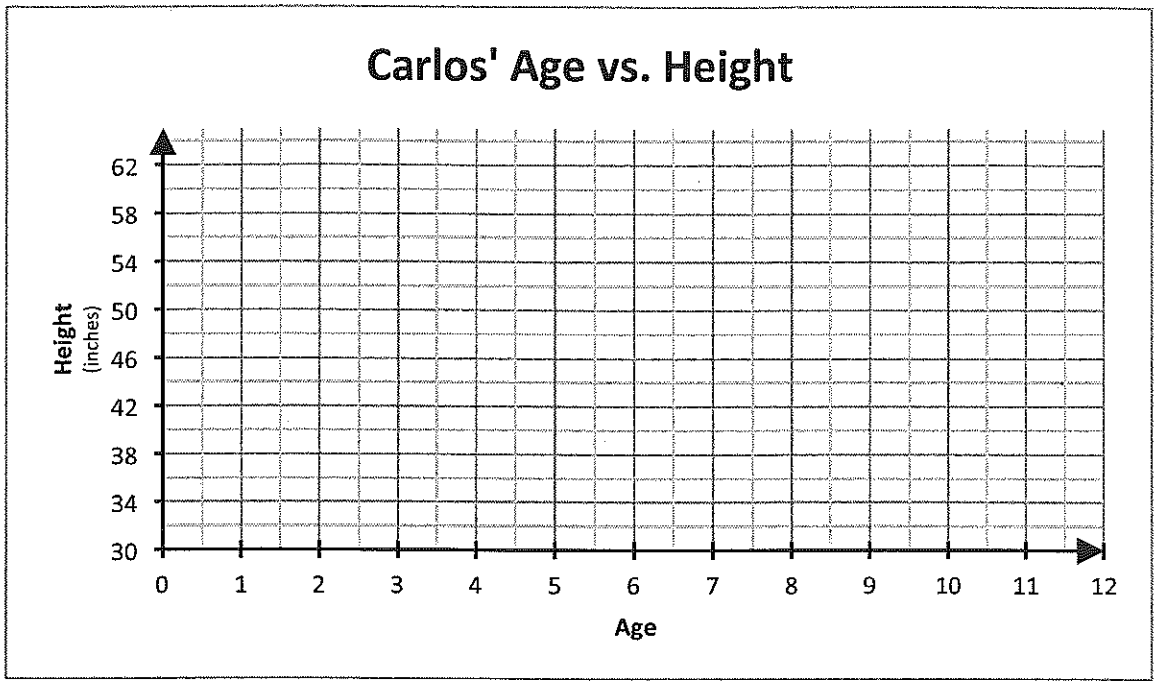
8. Draw a line of best fit and write an equation based on two data points on the line.

9. Use your equation to predict the number of indoor theaters there were in 1992. Are you using interpolation or extrapolation?

10. Use your equation to predict the number of indoor theaters there were in 2010. Are you using interpolation or extrapolation?

Carlos' parents began tracking his height when he was 2 years old. Every year on his birthday, they measured his height and recorded it in the chart shown below. Use this data to answers questions 11 – 15.

Age	Height (inches)
2	36
3	38
4	41
5	43
6	44
7	47
8	49
9	50
10	54
11	57
12	61



11. Make a scatter plot of this data on the graph shown above.

12. Draw a line of best fit and write an equation based on two data points on the line.

13. Use your equation to predict Carlos' height when he turns 21. Are you using interpolation or extrapolation?

14. Use your equation to predict Carlos' height when he was 8½ years old. Are you using interpolation of extrapolation?

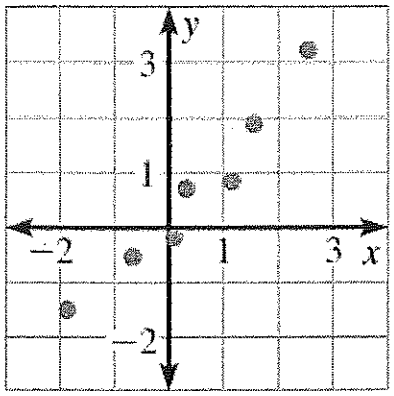
15. Is it likely that this age vs. height trend will continue for the rest of Carlos' life? Why or why not?

4.5B **Worksheet – Predicting with Linear Models** ANSWERS MAY VARY THROUGHOUT Name: ANSWERS

Algebra I

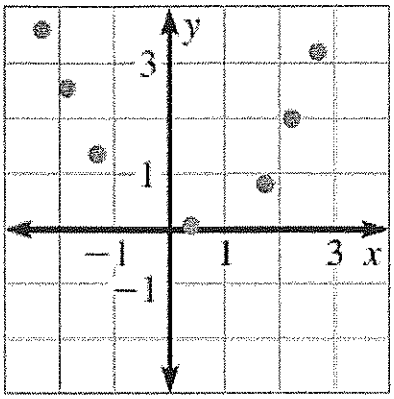
Tell whether it is reasonable for the graph to be represented by a linear model.

1.



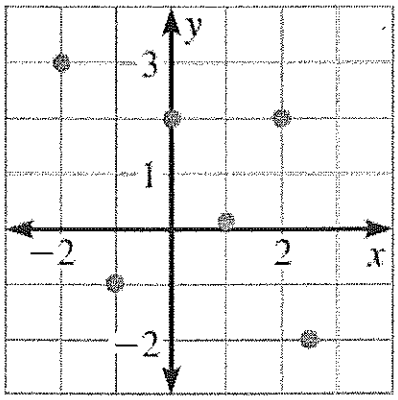
YES

2.



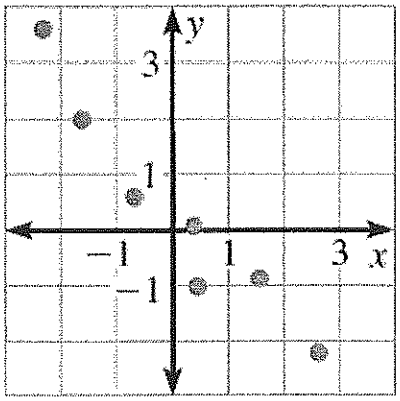
NO.

3.



No

4.



YES

Let $y = 4.2x + 7.1$ represent a company's profit, in thousands of dollars, from 1985 to 2010. Let x represent the number of years since 1985.

5. Use linear interpolation to predict the profit of the company for 1997.

$1997 - 1985 = 12$ yr.

$y = 4.2(12) + 7.1$

$= 57.5$ or \$57,500

6. Use linear extrapolation to predict the profit of the company for 2011.

$2011 - 1985 = 26$ yr.

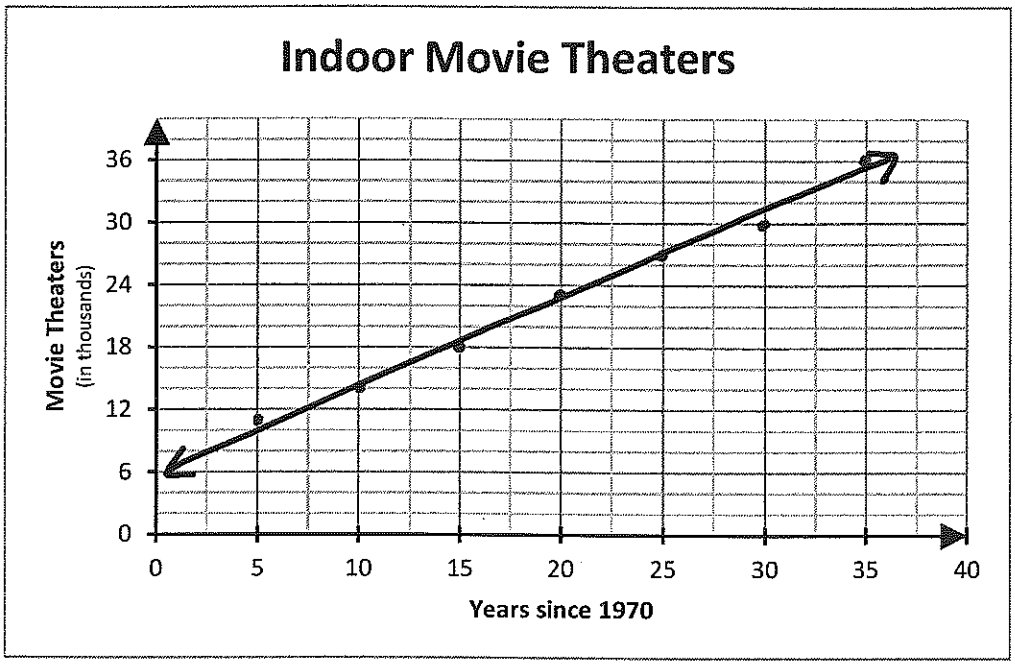
$y = 4.2(26) + 7.1$

$= 116.3$ or \$116,300

In exercises 7 – 10, use the table which shows the number of indoor movie theater screens (in thousands) from 1975 to 2005.

Year	1975	1980	1985	1990	1995	2000	2005
Indoor Movie Theaters (in thousands)	11	14	18	23	27	30	36

7. Make a scatter plot of the given data.



8. Draw a line of best fit and write an equation based on two data points on the line.

$(7.5, 12)$ $(25, 27)$

$m = \frac{27-12}{25-7.5} = \frac{15}{17.5} \approx 0.857$

$y - 27 = 0.857(x - 25)$

$y - 27 = 0.857x - 21.429$

$y = 0.857x + 5.571$

9. Use your equation to predict the number of indoor theaters there were in 1992. Are you using interpolation or extrapolation?

$y = 0.857(22) + 5.571$

$= 24.428 \approx$ 24,400 theaters

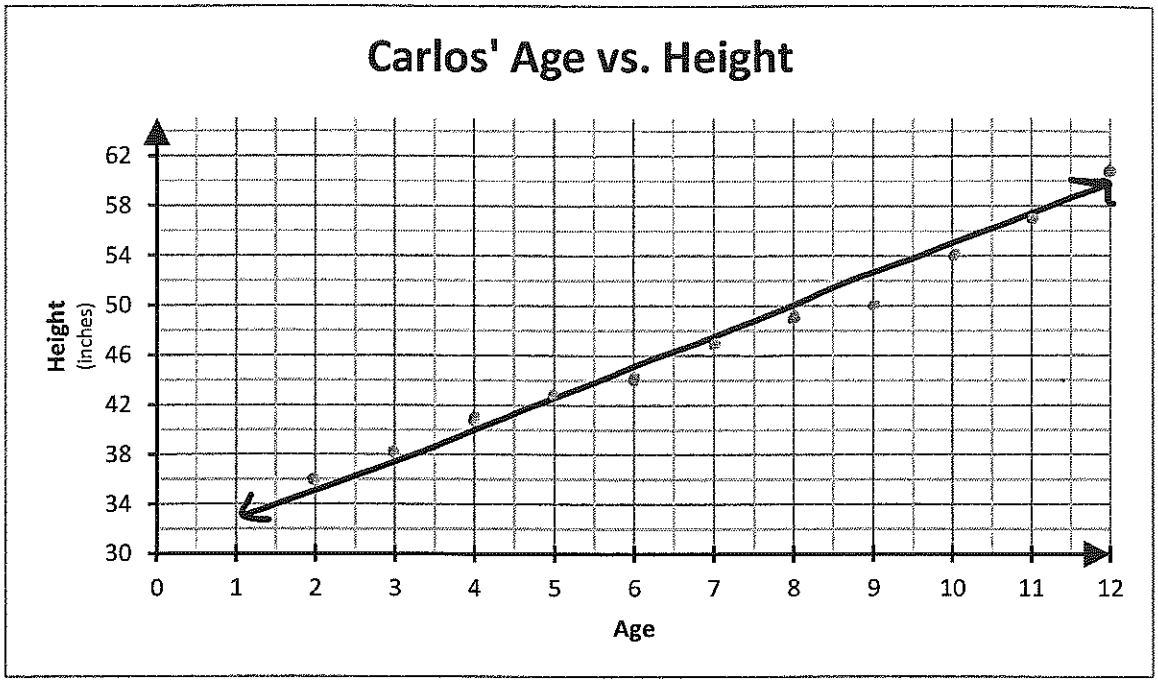
10. Use your equation to predict the number of indoor theaters there were in 2010. Are you using interpolation or extrapolation?

$y = 0.857(40) + 5.571$

$= 39.857 \approx$ 39,900 theaters

Carlos' parents began tracking his height when he was 2 years old. Every year on his birthday, they measured his height and recorded it in the chart shown below. Use this data to answers questions 11 – 15.

Age	Height (inches)
2	36
3	38
4	41
5	43
6	44
7	47
8	49
9	50
10	54
11	57
12	61



11. Make a scatter plot of this data on the graph shown above.

12. Draw a line of best fit and write an equation based on two data points on the line.

(4, 40) (9.5, 54)

$m = \frac{54 - 40}{9.5 - 4} = \frac{14}{5.5} \approx 2.545$

$y - 40 = 2.545(x - 4)$

$y - 40 = 2.545x - 10.182$

$y = 2.545x + 29.818$

13. Use your equation to predict Carlos' height when he turns 21. Are you using interpolation or extrapolation?

$y = 2.545(21) + 29.818$

$y = 83.273$ inches

realistic?

14. Use your equation to predict Carlos' height when he was 8½ years old. Are you using interpolation of extrapolation?

$y = 2.545(8.5) + 29.818$

$= 51.454$ inches

15. Is it likely that this age vs. height trend will continue for the rest of Carlos' life? Why or why not?

No → humans stop growing at some point and never grow as rapidly as during adolescence.