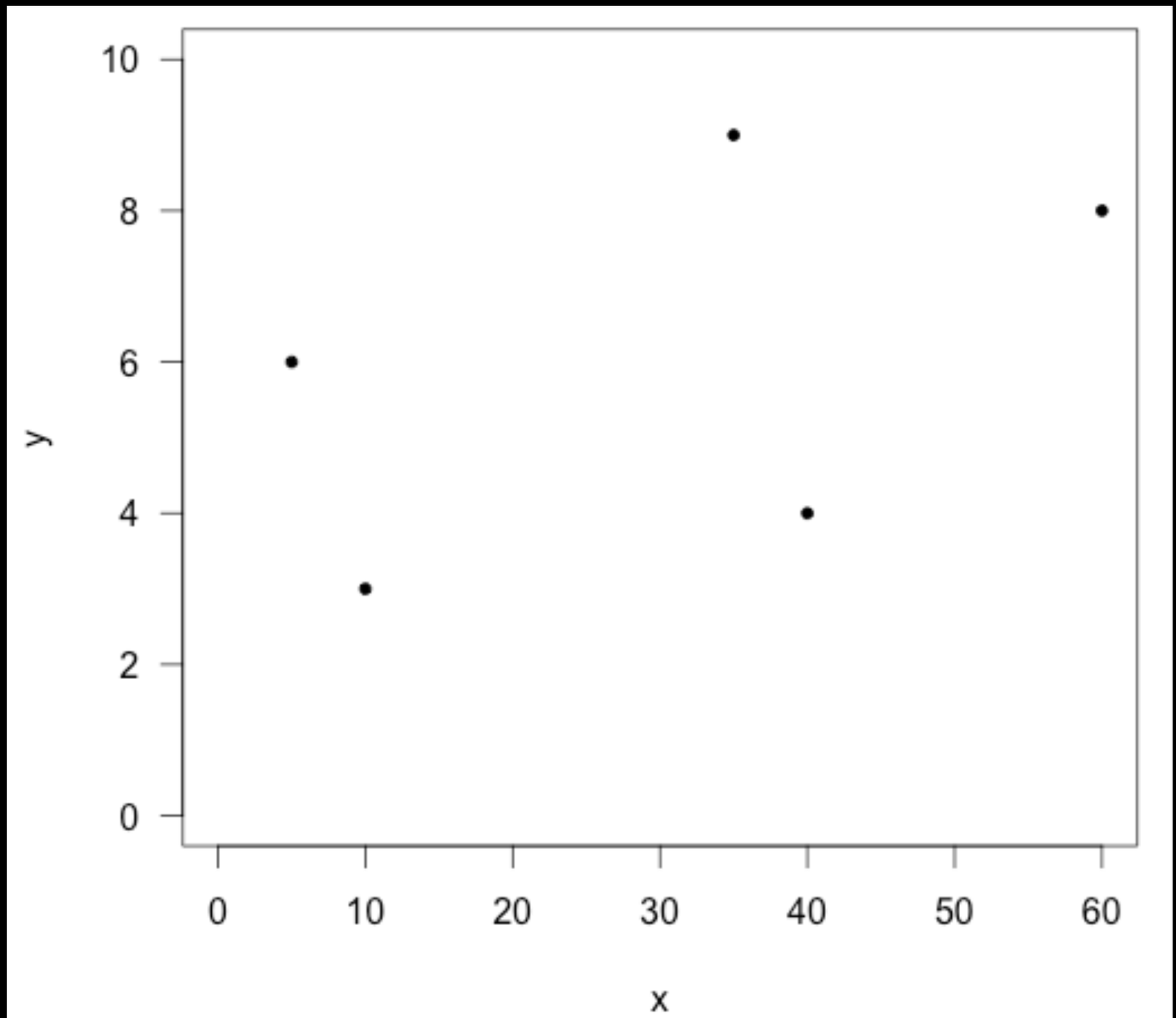
Calculating the Line of Best Fit

Our Data



Our Data

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM		**0**			**0**		
MEAN		**0**			**0**		
SD							

Our Objective

Calculate **R^2**

Calculate **a** and **b**

Our Objective

Calculate **R^2**

Calculate **a** and **b**

$$Y = a + b\,X$$

Calculate $\bar{x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM		**0**			**0**		
MEAN		**0**			**0**		
SD							

Calculate $\bar{x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM		**0**			**0**		
MEAN		**0**			**0**		
SD							

Calculate $\bar{x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM	**150**	**0**			**0**		
MEAN		**0**			**0**		
SD							

Calculate $\bar{x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate $\mathbf{SD_x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate $\mathbf{SD_x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5			6			
	10			3			
	35			9			
	40			4			
	60			8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate **SD_x**

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25		6			
	10	-20		3			
	35	5		9			
	40	10		4			
	60	30		8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate SD_x

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25		6			
	10	-20		3			
	35	5		9			
	40	10		4			
	60	30		8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate $\mathbf{SD_x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate SD_x

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**			**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate $\mathbf{SD_x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**		**0**		
MEAN	**30**	**0**			**0**		
SD							

Calculate SD_x

$$SD_x = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$$

Calculate SD_x

$$SD_x = \sqrt{\frac{2050}{4}}$$

Calculate SD_x

$$SD_x = \sqrt{\frac{2050}{4}} = 22.64$$

Calculate $\mathbf{SD_x}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**		**0**		
MEAN	**30**	**0**			**0**		
SD	**22.64**						

Calculate $\bar{y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**		**0**		
MEAN	**30**	**0**			**0**		
SD	**22.64**						

Calculate $\bar{y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**		**0**		
MEAN	**30**	**0**			**0**		
SD	**22.64**						

Calculate $\bar{y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**			**0**		
SD	**22.64**						

Calculate $\bar{y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate $\mathbf{SD_y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate $\mathbf{SD_y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6			
	10	-20	400	3			
	35	5	25	9			
	40	10	100	4			
	60	30	900	8			
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate $\mathbf{SD_y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0		
	10	-20	400	3	-3		
	35	5	25	9	3		
	40	10	100	4	-2		
	60	30	900	8	2		
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate SD_y

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0		
	10	-20	400	3	-3		
	35	5	25	9	3		
	40	10	100	4	-2		
	60	30	900	8	2		
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate **SD_y**

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0	0	
	10	-20	400	3	-3	9	
	35	5	25	9	3	9	
	40	10	100	4	-2	4	
	60	30	900	8	2	4	
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate SD_y

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0	0	
	10	-20	400	3	-3	9	
	35	5	25	9	3	9	
	40	10	100	4	-2	4	
	60	30	900	8	2	4	
SUM	**150**	**0**	**2050**	**30**	**0**		
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate $\mathbf{SD_y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0	0	
	10	-20	400	3	-3	9	
	35	5	25	9	3	9	
	40	10	100	4	-2	4	
	60	30	900	8	2	4	
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**						

Calculate SD_y

$$SD_y = \sqrt{\frac{\Sigma(y - \bar{y})^2}{n - 1}}$$

Calculate SD_y

$$SD_y = \sqrt{\frac{\Sigma(y - \bar{y})^2}{n - 1}} = \sqrt{\frac{26}{4}}$$

Calculate SD_y

$$SD_y = \sqrt{\frac{\Sigma(y - \bar{y})^2}{n - 1}} = \sqrt{\frac{26}{4}} = 2.55$$

Calculate $\mathbf{SD_y}$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0	0	
	10	-20	400	3	-3	9	
	35	5	25	9	3	9	
	40	10	100	4	-2	4	
	60	30	900	8	2	4	
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**			**2.55**			

Calculate **Σ (x - x̄) (y - ȳ)**

	x	(x - x̄)	(x - x̄)^2	y	(y - ȳ)	(y - ȳ)^2	(x - x̄)(y - ȳ)
	5	-25	625	6	0	0	
	10	-20	400	3	-3	9	
	35	5	25	9	3	9	
	40	10	100	4	-2	4	
	60	30	900	8	2	4	
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**			**2.55**			

Calculate $\Sigma (x - \bar{x})(y - \bar{y})$

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0	0	
	10	-20	400	3	-3	9	
	35	5	25	9	3	9	
	40	10	100	4	-2	4	
	60	30	900	8	2	4	
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**			**2.55**			

Calculate **Σ (x - x̄) (y - ȳ)**

	x	(x - x̄)	(x - x̄)^2	y	(y - ȳ)	(y - ȳ)^2	(x - x̄)(y - ȳ)
	5	-25	625	6	0	0	0
	10	-20	400	3	-3	9	60
	35	5	25	9	3	9	15
	40	10	100	4	-2	4	-20
	60	30	900	8	2	4	60
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**			**2.55**			

Calculate **Σ (x - x̄) (y - ȳ)**

	x	(x - x̄)	(x - x̄)^2	y	(y - ȳ)	(y - ȳ)^2	(x - x̄)(y - ȳ)
	5	-25	625	6	0	0	0
	10	-20	400	3	-3	9	60
	35	5	25	9	3	9	15
	40	10	100	4	-2	4	-20
	60	30	900	8	2	4	60
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	**115**
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**			**2.55**			

	x	$(x - \bar{x})$	$(x - \bar{x})^2$	y	$(y - \bar{y})$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
	5	-25	625	6	0	0	0
	10	-20	400	3	-3	9	60
	35	5	25	9	3	9	15
	40	10	100	4	-2	4	-20
	60	30	900	8	2	4	60
SUM	**150**	**0**	**2050**	**30**	**0**	**26**	**115**
MEAN	**30**	**0**		**6**	**0**		
SD	**22.64**			**2.55**			

Calculate **r**

$$r =$$

Calculate **r**

$$r = \frac{\Sigma (x - \bar{x})(y - \bar{y})}{(n-1)\, SD_x\, SD_y}$$

Calculate **r**

$$r = \frac{115}{(4)\,(22.64)\,(2.55)}$$

Calculate **r**

$$r = \frac{115}{(4)\,(22.64)\,(2.55)} = 0.498$$

Calculate R^2

$$R^2 =$$

Calculate R^2

$$R^2 = (r)^2$$

Calculate R^2

$$R^2 = (0.498)^2$$

Calculate R^2

$$R^2 = (0.498)^2 = 0.248$$

Calculate **b**

b =

Calculate **b**

$$b = (r)\frac{SD_y}{SD_x}$$

Calculate **b**

$$b = (0.498)\frac{2.55}{22.64}$$

Calculate **b**

$$b = (0.498)\frac{2.55}{22.64} = 0.056$$

Calculate **a**

a =

Calculate **a**

$$a = \bar{y} - b\,\bar{x}$$

Calculate **a**

$$a = 6 - 0.056 (30)$$

Calculate **a**

$$a = 6 - 0.056\,(\,30\,) = 4.32$$

Our Line

$$Y = a + b\,X$$

Our Line

$$Y = a + b\,X$$

$$Y = 4.32 + 0.056\,X$$

Our Line