Student Worksheet 1
TI-30XB MultiView™: Making Predictions

W1

Name:

Below is some example data from a practical situation:

Three students were asked to hold hands in a circle, one was assigned to be leader. Another student (the timer) used a stopwatch. As soon as the timer said "Go!" the leader of the hand squeezers sent a hand squeeze to the next person, who passed it onto the next, who passed it onto the next person.

As soon as the leader received the hand squeeze, they called out "Stop!" and the timer stopped the stopwatch, and recorded the number of people and the time taken for the hand squeeze to travel around in a circle.

Two more students were added to the circle (making five in total) and the process repeated. Four more students were added to the circle (making nine in total) and the process repeated.

Additional students were added to collect more data, recorded in the table below.

On this worksheet we will graph this data and will identify a trend. An estimated trend is called a 'line-of-good-fit.'

We will use the 'line-of-good-fit' and make a prediction using the data.

You will enter the data on your calculator and use the statistical functions to calculate the mathematical trend line, called a 'line-of-best-fit.' The 'line-of-best-fit' can be used to make more accurate predictions, based on the data.

As a class, we will conduct the same experiment, and repeat the steps for some 'real data.'

No. People	Time (s)
3	0.87
5	1.62
9	4.51
11	4.79
16	5.89
22	6.81
25	9.03

On the graph scale on the next page:

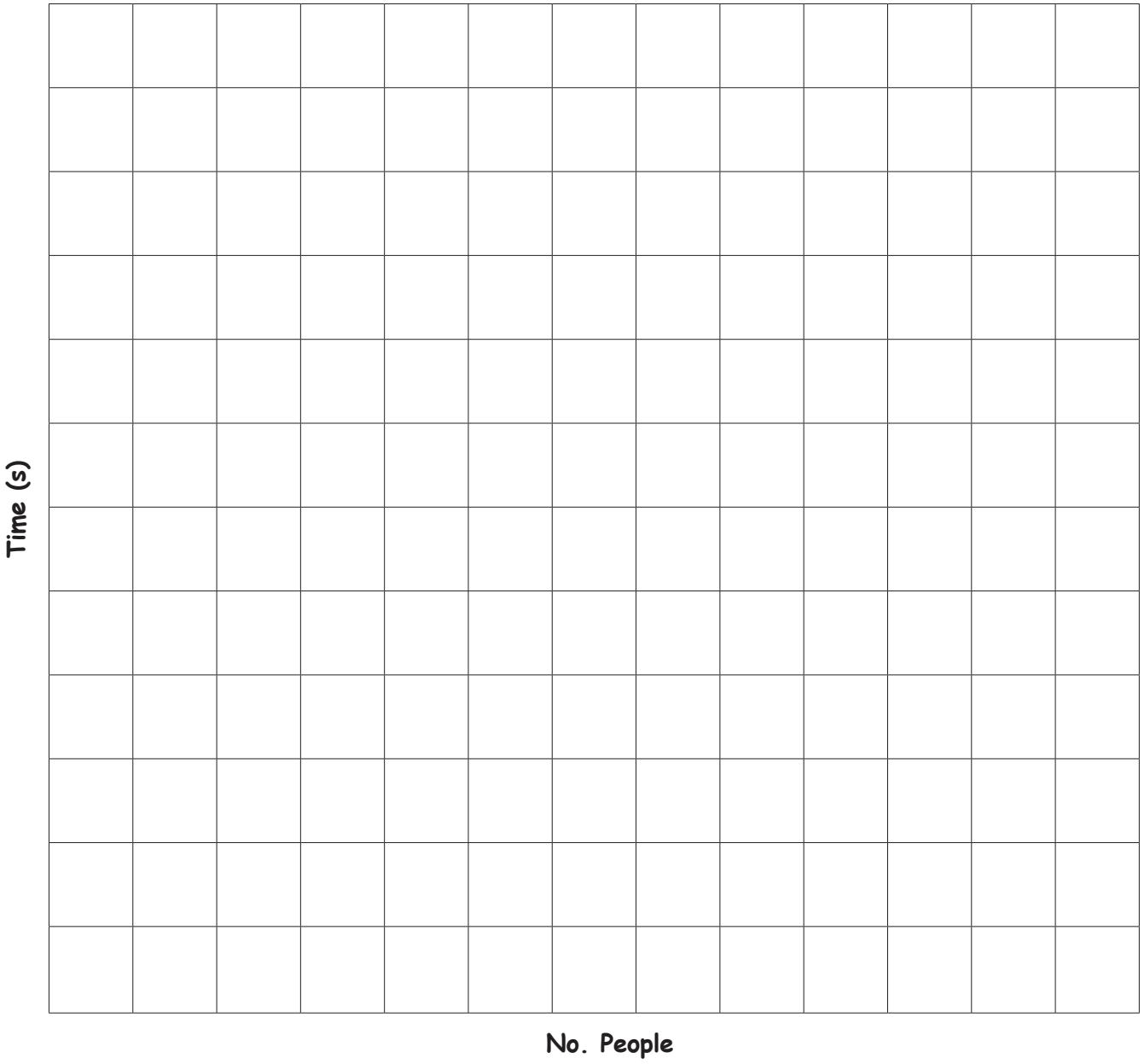
- Number the scale on the horizontal axis (No. People), starting at zero, and counting by 2's.
- Number the scale on the vertical axis (Time in Seconds), starting at zero, an counting by 1's.

Plot the data example data. Use your ruler to draw a single straight line that estimates the trend line, called the 'line-of-good-fit.'

Student Worksheet 1
TI-30XB MultiView™: Making Predictions

W1

Example Data: Sending a Hand Squeeze Around a Group



3. Enter the data into the calculator

We need to keep track of our two variables. The **independent variable** (List 1 or L_1 on the calculator) is the number of people in the circle. This variable is independent because we have control over it.

The **dependent variable** (List 2 or L_2 on the calculator) is the time taken for the hand squeeze to be transferred around the group. This variable is dependent because it varies according to how many people are in the circle. For instance, having more people means it takes a longer time for a hand squeeze to be transferred around the group.

To enter data, use the **data** key and ⊙ key to enter the data from the above table for the number of people in List L_1. Use the ⊙ key to move across to List L_2, and then use the ⊙ key to move down the list. Enter the corresponding data for the time taken for the hand squeeze to be transferred around the group at each time.

4. Analyse the data

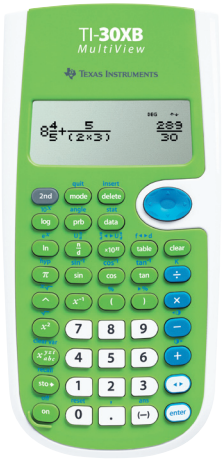
Use the statistical functions on the TI-30XB MultiView™ to make sense of the data.

Press [2nd][stat] and choose 2: 2-Var Stats (refers to statistics with two variables).
The calculator will default to choosing L_1 for x-data (independent variable – Number of People) and L_2 for y-data (dependent variable – Time in Seconds).

Use the ⊙ key twice to scroll down to CALC and press [enter]. This will display a range of statistical results.

Use the ⊙ key 14 times to scroll down until you see the values displayed for this data set:

D: a = 0.3302392344
E: b = 0.4954613807
F: r = 0.9668908586



Round these numbers to two decimal places:

D: a = _____

E: b = _____

F: r = _____

5. Making sense of our data

Time Taken = **a** x No. People + **b**

Using the example data, our rule (from our 'line-of-best-fit') is:

Time Taken = _____ x No. People + _____

We can shorten this up to:

T = _____ x P + _____

We can use our rule ('line-of-best-fit') to make accurate predictions for the time taken to send a hand squeeze around a larger group. Use your calculator to complete the table:

No. People	Time (s)
50	
200	
1,200	
5,000	
25,000	
1,200,000	
20,000,000	

Discussion points:

Where does the extra half a second come from?

Can we ignore the extra half a second when making predictions for large numbers of people?

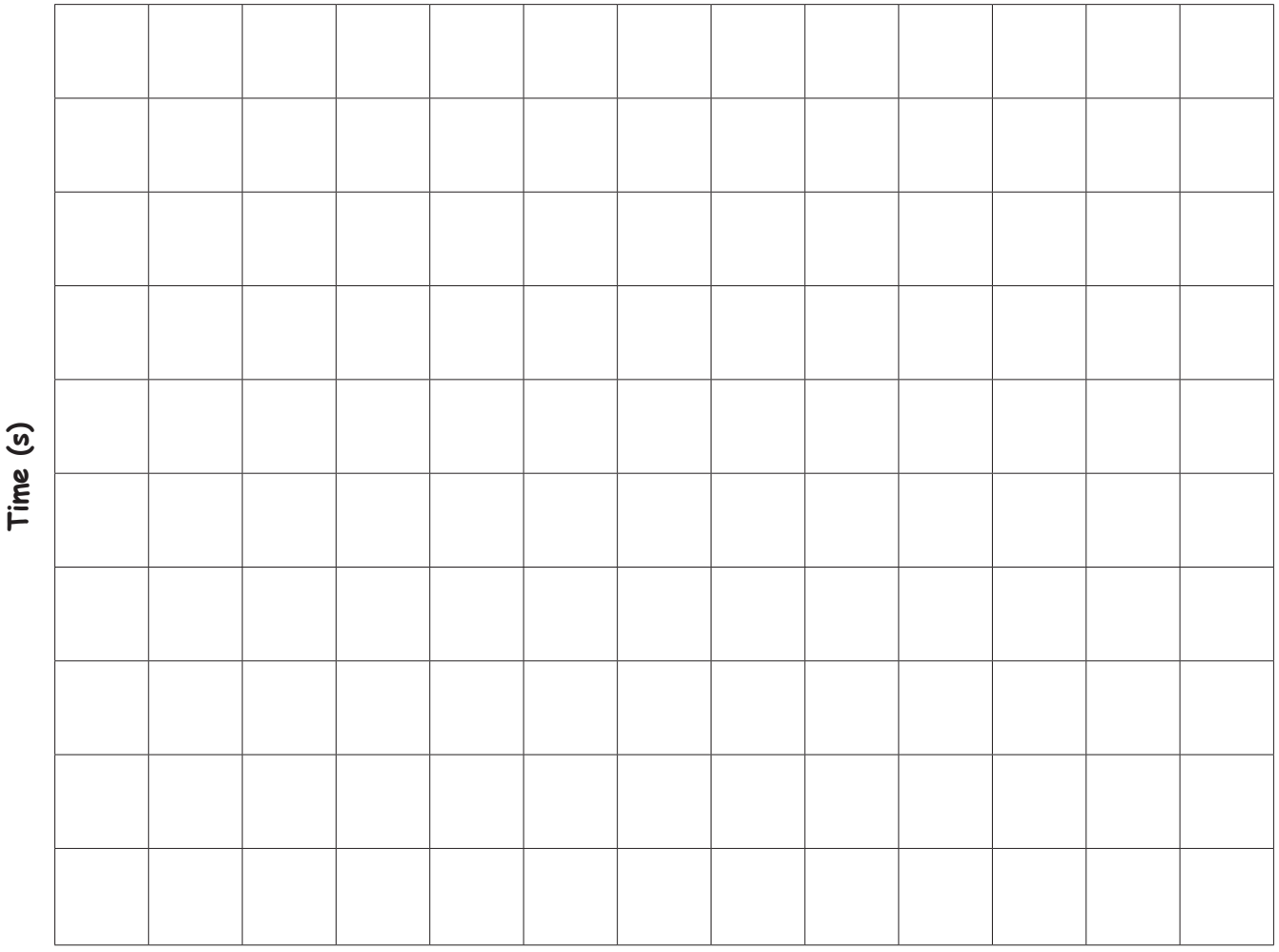
Student Worksheet 1
TI-30XB MultiView™: Matchstick Mathematics

W1

Our Class Data:

No. People	Time (s)

Example Data: Sending a Hand Squeeze Around a Group



Enter your class data, and record a, b and r:

D: a = _____

E: b = _____

F: r = _____

Round these numbers to two decimal places:

D: a = _____

E: b = _____

F: r = _____

Time Taken = **a** x No. People + **b**

Using the class data, our rule (from our 'line of best fit') is:

Time Taken = _____ x No. People + _____

We can shorten this up to:

T = _____ x P + _____

Use your calculator and the rule to make predictions, based on the class data for sending a hand squeeze around larger groups of people. Record your predicted data in the table.

Group	Our class	Our year level	Our school	Our town/city	Australia	The world
No. People					21 007 310	6 706 993 152
Time (s)						

Student Worksheet 2
TI-30XB MultiView™: Making Predictions

W2

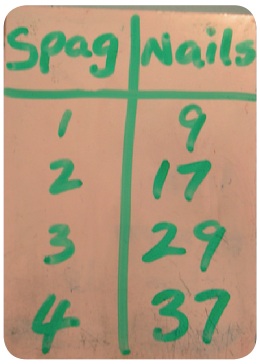
Name:

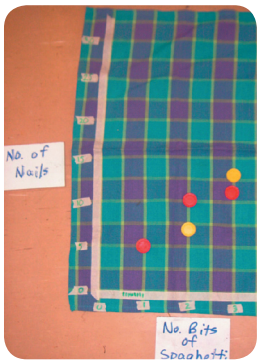
Investigation: How strong is Spaghetti?

1. Poke a single strand of spaghetti through a foam cup, or devise a hanger as in the picture, to suspend the cup below the spaghetti and then hang both across a 15 cm gap between two desks.
2. Add the weighted items (nails, nuts, or bolts) one by one to the foam cup. Record how many weighted items are needed for the spaghetti to break.
3. Record this data in your table.
4. Poke two strands of spaghetti through the foam cup, and repeat the process.
5. Repeat the process for three and four strands of spaghetti.

Note: Ensure that your spaghetti is at **right angles** to the edge of the desk.
Have someone in your group 'catching' the foam cup, so that it doesn't hit the floor.

No. Pieces of Spaghetti	No. of Weighted Items
1	
2	
3	
4	





6. Graph your data on the blank graph provided, choosing your scale to suit your data.

7. Follow the steps outline in the Hand Squeeze activity to enter your data into a TI-30XB MultiView™ calculator, and find out the values for a, b and r. Record these below:

   D: a = _____

   E: b = _____

   F: r = _____

   Round these numbers to two decimal places:

   D: a = _____

   E: b = _____

   F: r = _____

   Using the class data, our rule (from our 'line-of-best-fit') is:

   No. Weights = **a** x No. Pieces of Spaghetti + **b**

   We can shorten this up to:

   W = **a** x S + **b**

   W = _____ x S + _____

   Use your rule to make predictions for five, six and seven pieces of spaghetti, and then test your rule.

No. Pieces of Spaghetti	Prediction	Experimental
	No. of Weighted Items	No. of Weighted Items
5		
6		
7		

Student Worksheet 2
TI-30XB MultiView™: Making Predictions

W2

Testing the Strength of Spaghetti:

No. Weighted Objects

No. Pieces of Spaghetti

Assessment Task
TI-30XB MultiView™: Making Predictions

AT

Name:

The Year 7 class at Beyond the Black Stump School conducted an experiment to test the strength of spaghetti. They tested the strength for 1, 2, 3, and 4 strands of spaghetti. They used their TI-30XB MultiView™ calculators to find the line-of-best-fit for each data set, and to graph the data. They made some predictions of the strength of 5, 6 and 7 strands of spaghetti.

They were split into three groups: Wombats, Possums and Echidnas.

Unfortunately, local flooding destroyed most of their working. All that was left was the original three data sets pinned up on the wall. The predictions of the strength of 5, 6 and 7 strands of spaghetti, for the three groups, were found floating in the flood water, separated from the original data sets.

Your task:

Use your calculator to find the line-of-best-fit for each of the three groups data set.
Graph each set of data – this can be done on the same graph.
Use this information to match the predictions found with the correct data set.

Group: Wombats		Our calculations based on the given data
No. Strands of Spaghetti	No. Nails	a = b = Equation of line-of-best-fit is: This equation changed to suit the context would be:
1	8	
2	15	
3	26	
4	30	

Group: Possums		Our calculations based on the given data
No. Strands of Spaghetti	No. Nails	a = b = Equation of line-of-best-fit is: This equation changed to suit the context would be:
1	10	
2	19	
3	29	
4	39	

Group: Echidnas		Our calculations based on the given data
No. Strands of Spaghetti	No. Nails	a = b = Equation of line-of-best-fit is: This equation changed to suit the context would be:
1	8	
2	17	
3	28	
4	35	

Graph of Data from Beyond the Black Stump School

Predictions Data Sets

Below are the three predictions that were found in the flood water.

Your job is to match these three data sets below with the original three data sets for 1, 2, 3 and 4 strands of spaghetti.

So, for example, is Set A likely to be the predictions for the Wombats, Possums or Echidnas original data set? – explain your answer.

Set A		This data belongs to …
No. Strands of Spaghetti	**No. Nails**	because …
5	45	
6	54	
7	63	

Set B		This data belongs to …
No. Strands of Spaghetti	**No. Nails**	because …
5	39	
6	47	
7	54	

Set C		This data belongs to …
No. Strands of Spaghetti	**No. Nails**	because …
5	49	
6	58	
7	68	