

## ONLINE SUPPLEMENTAL MATERIALS

### *Science Tasks – additional details*

Questions relating to children's basic science knowledge presented each variable individually; for example, participants were shown a picture of a truck at the top of a hill (slope) and one in the middle of a slope and were then asked to indicate which truck would travel the furthest down the slope and continue along a flat surface at the bottom. Questions testing children's conceptual knowledge involved, for example, a truck at the top of a steep hill, a high friction surface with no weight in the truck. Children were shown how far it would travel along a scale positioned at the bottom of the hill. The example always showed that the truck would travel to the middle of the scale. Children were then presented with a number of pictures of the truck and asked to predict how far it would travel. In these questions at least two factors were changed from the example. Children completed a similar tests at pre- and post-test, although we developed different versions, each featuring a different example truck, ensuring that the test was slightly different at each of the time points.

### *Instructions for interactions science tasks.*

#### Day one – Surface and force.

In this task you will be experimenting with two factors: surface and force. You can choose between two different surfaces: carpet and wood (we will not be using ice or vinyl). You can also choose between two different forces: a big push and a small push. Please answer the questions on your worksheet. Next, you will be experimenting with two factors: gradient and weight. You can choose between two gradients: steep and gentle. You can also choose between two weights: no weight and heavy weight (we will not be using the parachutes). Please answer the questions on your worksheet. Remember to answer the questions correctly.

### Day Two – gradient and weight.

Think about what you learned yesterday working with two factors, such as gradient (slope) and weight. Today instead of only working with two factors at a time you will be combining them to work with all four factors. Today you can start the car at the top gate to give it a big push or at the lower gate to give it a small push. We want you to experiment with these factors and answer the questions on your worksheet. Remember to answer the questions correctly.

### Day three – interactive task.

Think about what you have learned about factors such as gradient and weight, as well as about conducting a fair test. Today we are going to show you a video about a girl who wants to test out different kinds of skis. Please watch the video carefully, then half way through we will stop it to give you a chance to answer the questions. When you have answered, you can watch the rest of the video to find out the answers.

## Tables of correlations among conversation measures and regression summary statistics

(a) All participants: correlations, means and standard deviations of conversation measures, N=160.

Conversation feature	Mean	Sd	1	2	3	4	5	6	7	8	9	10
1. Procedural	8.89	5.18										
2. Basic	3.80	2.92	.407**									
3. Conceptual	0.65	1.22	-.059	.027								
4. Applied	0.04	0.19	-.041	.025	-.106							
5. Social (off topic)	1.20	2.40	.098	-.015	-.185*	.080						
6. Assertion	2.53	0.79	.151	.201	.184*	.051	.139					
7. Affiliation	5.07	0.92	.192*	.275**	.130	-.014	-.127	.291**				
8. Basic Knowledge Pre-Test	2.82	0.96	.038	-.059	-.089	.074	-.116	-.059	-.066			
9. Basic Knowledge Post-Test	3.49	0.73	.155	-.047	.014	-.177*	-.135	0	.025	.181*		
10. Conceptual Knowledge Pre-Test	19.16	3.42	-.129	.126	-.145	.019	.027	-.130	-.053	-.233**	-.465**	
11. Conceptual Knowledge Post-test	20.15	3.66	.146	-.060	-.067	.049	.012	.118	.043	-.223**	-.210*	.223**

(b) Girls only: correlations, means and standard deviations of conversation measures, N=84.

Conversation feature	Mean	Sd	1	2	3	4	5	6	7	8	9	10
1. Procedural	9.00	5.56										
2. Basic	4.15	3.10	.477**									
3. Conceptual	0.31	0.71	.146	.212								
4. Applied	0.01	0.11	.054	.278*	-.047							
5. Social (off topic)	1.09	2.14	.092	-.024	-.074	-.056						
6. Assertion	2.57	0.92	.234*	.302**	-.100	.117	.062					
7. Affiliation	5.26	1.09	.395**	.467**	.198	.126	-.333**	.364**				
8. Basic Knowledge Pre-Test	2.67	0.96	-.087	-.123	-.162	.153	-.145	-.133	-.174			
9. Basic Knowledge Post-Test	3.46	0.72	.227*	-.005	.026	.084	-.228*	.062	.081	.293**		
10. Conceptual Knowledge Pre-Test	19.56	3.07	-.113	.060	-.157	-.075	.072	-.184	-.142	-.209	-.474**	
11. Conceptual Knowledge Post-test	18.96	3.54	-.206	-.044	-.122	-.125	.095	.026	.026	-.170	-.228*	.268*

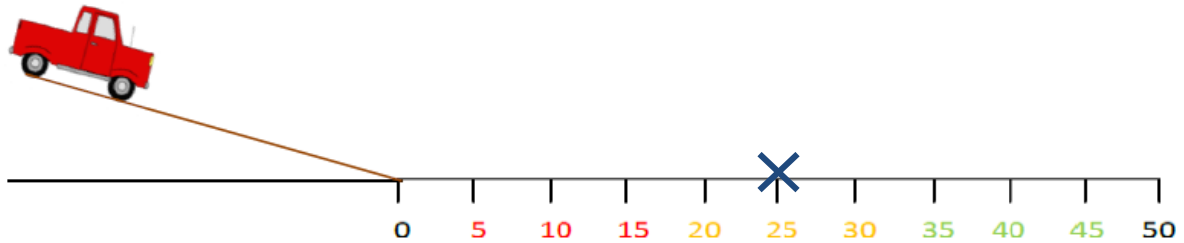
(c) Boys only: correlations, means and standard deviations of conversation measures, N=72.

Conversation feature	Mean	Sd	1	2	3	4	5	6	7	8	9	10
1. Procedural	7.92	4.42										
2. Basic	3.39	2.66	.276*									
3. Conceptual	1.06	1.54	-.167	-.005								
4. Applied	0.07	0.26	-.088	-.082	-.188							
5. Social (off topic)	1.33	2.69	.117	.007	-.279*	.130						
6. Assertion	2.84	0.86	.063	.126	.298*	-.028	.213					
7. Affiliation	5.01	0.90	-.194	-.090	.191	-.077	.122	.261*				
8. Basic Knowledge Pre-Test	3.00	0.93	.026	.079	.051	.000	-.067	-.051	.159			
9. Basic Knowledge Post-Test	3.53	0.75	.115	-.093	.009	-.357**	-.040	-.106	-.041	.034		
10. Conceptual Knowledge Pre-Test	18.07	4.23	-.050	.185	-.169	.136	-.009	.039	.069	-.199	-.442**	
11. Conceptual Knowledge Post-test	20.19	3.16	.259*	-.058	.001	.095	-.060	.185	.083	-.318**	-.210	.229

Note; \* $p < .05$ , \*\* $p < .01$ .

*Example item from science test of basic and conceptual science knowledge.*

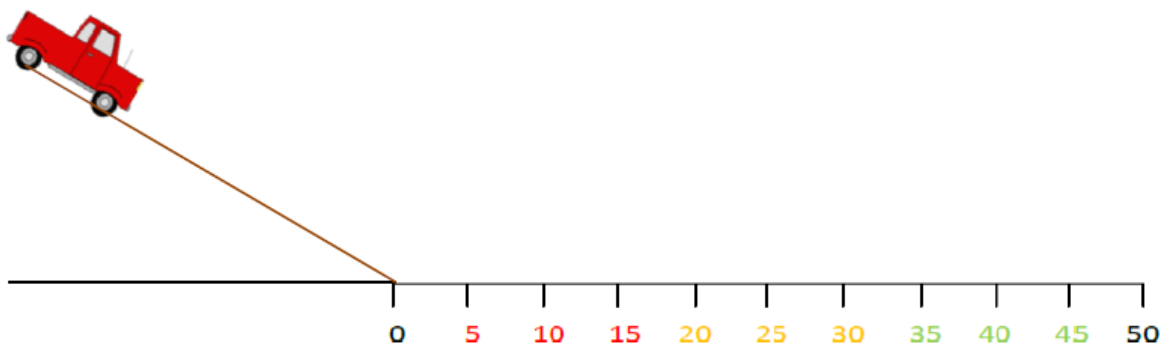
*When it is released, this truck travels 30cm to the X marked on the scale.*



*Knowing this, can you predict how far the other trucks will travel?*

*Please mark your answer with an X somewhere on the scale.*

(a) How far would this truck travel?



(b) How far would this truck travel?

