

**Principles of Mathematics Grade 10: Shape and Space
An Item-Level Analysis (Provincial Level)**

British Columbia

All schools

June/2007

Provincial Principles of Mathematics 10 Item-Level Response Reports include data for all BC students who wrote the exam in June 2007 (about 26,530 students). Both public and independent schools are included. The Principles of Mathematics 10 June 2007 provincial Item-Level Response Report displays the proportion of students who made errors on each exam item of this specific curriculum organizer: Shape and Space.

Click [here](#) to view the Prescribed Learning Outcomes

Form	Item #	Question type	Prescribed Learning Outcomes	Number of Students who Responded to the Item	Percentage of Students who Answered Incorrectly	Specific Curricular Aspect that Needs Attention [$>20\%$ selected incorrect response]
A	46	MC	D2	4836	44	<ul style="list-style-type: none"> When comparing the surface areas of 2 spheres, students gave the ratio of diameters.
A	47	MC	D1	4834	33	*
A	48	MC	D4	4817	60	<ul style="list-style-type: none"> Students correctly used the sine ratio to obtain an angle but chose the value of the acute angle instead of obtuse angle.
A	50	MC	D5	4827	37	*
A	51	MC	D5	4825	47	<ul style="list-style-type: none"> Students incorrectly used the tan ratio in a scalene triangle.
A	52	MC	D5	4782	51	<ul style="list-style-type: none"> Students likely used the cosine law to calculate the third side in a triangle knowing the other 2 sides and the angle in between, but made

						numerical mistakes.
A	53	MC	D8	4829	24	*
A	54	MC	D6	4828	31	*
A	56	MC	D7	4836	29	*
A	57	MC	D9	4835	35	<ul style="list-style-type: none"> Students incorrectly found the sign of the slope of a line knowing the x and y-intercepts.
A	58	MC	D9	4820	49	<ul style="list-style-type: none"> Students correctly found the slope of a line passing through 2 points, but incorrectly obtained the constant term.
A	59	MC	D10	4821	49	<ul style="list-style-type: none"> Students incorrectly used the condition of perpendicular lines to find the coordinate of a point.
A	60	MC	D10	4827	60	<ul style="list-style-type: none"> Students made a mistake in obtaining the y-intercept when finding the equation of a line perpendicular on another line.
B	46	MC	D7	4262	40	*
B	47	MC	D6	4230	44	<ul style="list-style-type: none"> When writing the perimeter of a triangle using vertices coordinates, students incorrectly manipulated formula for the length of a line segment and operations with radicals.
B	48	MC	D2	4216	62	<ul style="list-style-type: none"> Students incorrectly solved an exponential equation to compute the ratio of sides of two cubes when knowing the ratio of volumes.
B	50	MC	D3	4250	52	<ul style="list-style-type: none"> In a problem involving two right triangles, students correctly obtained an angle but

						<p>incorrectly used the cosine instead of tan ratio to find the length of a side.</p> <ul style="list-style-type: none"> In a problem involving two right triangles, students incorrectly obtained an angle and used the cosine instead of tan ratio to find the length of a side.
B	51	MC	D3	4222	50	<ul style="list-style-type: none"> In a problem involving elevation angles, students incorrectly used the distance to a tower to obtain its height.
B	52	MC	D4	4267	14	N/A
B	53	MC	D5	4239	40	*
B	54	MC	D5	4219	44	*
B	56	MC	D8	4249	52	*
B	57	MC	D9	4257	37	<ul style="list-style-type: none"> Students correctly found the slope of a line passing through 2 points, but incorrectly obtained the constant term.
B	58	MC	D9	4225	82	<ul style="list-style-type: none"> Students correctly obtained the slope y-intercept form of an equation of a line but made numerical mistakes in solving a linear equation to find unknown parameters.
B	59	MC	D10	4263	58	<ul style="list-style-type: none"> When obtaining the slope of a perpendicular line, students did not reciprocate and did not take the negative sign of the original slope. When obtaining the slope of a perpendicular line, students did not take the negative sign of the original slope.

B	60	MC	D10	4252	57	<ul style="list-style-type: none"> Students likely obtained the slope y-intercept equation of a line but made a mistake when verifying which point could be on this line.
C	46	MC	D3	4351	40	*
C	47	MC	D3	4350	53	<ul style="list-style-type: none"> In a problem involving elevation angles, students incorrectly applied the definition of the tan ratio to obtain two distances.
C	48	MC	D3	4344	35	<ul style="list-style-type: none"> In a problem involving two right triangles, students likely did not use the appropriate trigonometric ratios.
C	50	MC	D5	4358	34	*
C	51	MC	D5	4338	51	<ul style="list-style-type: none"> Students incorrectly manipulated the cosine and sine laws in finding the measure of an angle.
C	52	MC	D5	4302	65	<ul style="list-style-type: none"> Students made several mistakes in applying the cosine law and using trigonometric ratios when solving a triangle and obtaining the area.
C	53	MC	D8	4362	24	*
C	54	MC	D8	4352	81	<ul style="list-style-type: none"> When obtaining the slope of a line knowing the intercepts, students switched the x and y intercepts and made a sign error. When obtaining the slope of a line knowing the x and y intercepts, students made a sign error.
C	56	MC	D2	4361	54	<ul style="list-style-type: none"> When comparing the surface areas of two cubes, students incorrectly found that the ratio of areas was the ratio of side lengths cubed.

C	57	MC	D7	4354	37	*
C	58	MC	D9	4352	78	<ul style="list-style-type: none"> When determining the equation of a line, students misinterpreted the information regarding intercepts.
C	59	MC	D10	4352	63	<ul style="list-style-type: none"> Students incorrectly used the condition of perpendicular lines to find a slope (changed sign but did not reciprocate) and then used correctly the coordinates of a point to find the y-intercept. Students incorrectly used the condition of perpendicular lines to find a slope (did not change sign but reciprocated) and then used correctly the coordinates of a point to find the y-intercept.
C	60	MC	D10	4352	72	<ul style="list-style-type: none"> Students gave the x-intercept of the given equation instead of using the information given to find the y-intercept of the parallel line. Students incorrectly indicated the y-intercept of a graphed line instead of using the information to find the y-intercept of a parallel line. Students used the y-intercept of the given equation instead of using the information given to determine the y-intercept of a parallel line.
D	46	MC	D6	4802	33	*
D	47	MC	D7	4824	20	*
D	48	MC	D2	4779	71	<ul style="list-style-type: none"> In a problem comparing the surface areas of two spheres, students incorrectly thought that area and diameters increase by the same ratio. In a problem comparing the surface areas of two

						spheres, students likely correctly found the ratio of radii but incorrectly multiplied by 2 to find the ratio of diameters.
D	50	MC	D4	4822	65	<ul style="list-style-type: none"> Students correctly used the sine ratio to obtain an angle but chose the value of an acute angle instead of an obtuse angle.
D	51	MC	D3	4761	66	<ul style="list-style-type: none"> In a problem involving overlapped right triangles, students correctly used the sine ratio to calculate an angle but did not recognize that another angle was required. In a problem involving overlapped right triangles, students probably correctly used trigonometric ratios to calculate angles but made a numerical mistake in obtaining the required angle.
D	52	MC	D5	4818	28	*
D	53	MC	D5	4811	40	*
D	54	MC	D5	4743	45	<ul style="list-style-type: none"> When solving a problem involving two overlapping triangles, students were unable to apply both cosine and sine laws to obtain a side length.
D	56	MC	D8	4823	38	*
D	57	MC	D9	4816	38	*
D	58	MC	D9	4810	69	<ul style="list-style-type: none"> When given the graph of a line to determine a parameter of its equation, students made a sign error.
D	59	MC	D10	4813	52	<ul style="list-style-type: none"> Students correctly used the condition of perpendicular lines to find a slope, but incorrectly

						used the coordinates of a point to find the equation of the perpendicular line. The y-intercept contains a sign error.
D	60	MC	D10	4814	58	<ul style="list-style-type: none"> Students incorrectly used the condition of parallel lines to find a slope, but correctly used the coordinates of a point to find the equation of the line.
E	46	MC	D6	3973	38	<ul style="list-style-type: none"> Students were unable to obtain the distance between two points and simplify the result involving a mixed radical.
E	47	MC	D7	3990	21	*
E	48	MC	D2	3974	73	<ul style="list-style-type: none"> In a problem comparing the surface areas of two spheres, students incorrectly thought that area and diameters increase by the same ratio. In a problem comparing the surface areas of two spheres, students likely correctly found the ratio of radii but incorrectly multiplied by 2 to find the ratio of diameters.
E	50	MC	D4	3995	63	<ul style="list-style-type: none"> Students correctly used the sine ratio to obtain an angle but chose the value of an acute angle instead of an obtuse angle.
E	51	MC	D3	3961	72	<ul style="list-style-type: none"> In a problem involving overlapped right triangles, students correctly used the sine ratio to calculate an angle but did not recognize that another angle was required. In a problem involving overlapped right triangles, students probably correctly used trigonometric

						ratios to calculate angles but made a numerical mistake in obtaining the required angle.
E	52	MC	D5	3989	30	<ul style="list-style-type: none"> Students correctly applied the sine law in but determined another side of the triangle.
E	53	MC	D5	3984	44	*
E	54	MC	D5	3920	51	<ul style="list-style-type: none"> When solving a problem involving two overlapping triangles, students were unable to apply both cosine and sine laws to obtain a side length.
E	56	MC	D8	3993	40	*
E	57	MC	D9	3990	43	*
E	58	MC	D9	3988	75	<ul style="list-style-type: none"> When given the graph of a line to determine a parameter of its equation, students made a sign error.
E	59	MC	D10	3981	58	<ul style="list-style-type: none"> Students correctly used the condition of perpendicular lines to find a slope, but incorrectly used the coordinates of a point to find the equation of the perpendicular line. The y-intercept contains a sign error. Students incorrectly used the condition of perpendicular lines to find a slope and the coordinates of a point to find the equation of the perpendicular line. The y-intercept is correct, but the slope contains a sign error.
E	60	MC	D10	3987	59	<ul style="list-style-type: none"> Students correctly used the condition of parallel lines to find a slope, but incorrectly used the coordinates of a point to find the equation of the

						<p>line.</p> <ul style="list-style-type: none"> Students incorrectly used the condition of parallel lines to find a slope, but correctly used the coordinates of a point to find the equation of the line.
F	46	MC	D1	4192	14	N/A
F	47	MC	D2	4191	33	*
F	48	MC	D3	4153	24	*
F	50	MC	D4	4195	41	<ul style="list-style-type: none"> Students did not recognize that a right angle and a straight angle do not have the same sine value.
F	51	MC	D5	4190	37	*
F	52	MC	D5	4169	42	<ul style="list-style-type: none"> Students possibly used the tangent ratio in a non-right angle triangle instead of applying the cosine and sine laws to determine an angle.
F	53	MC	D5	4157	47	<ul style="list-style-type: none"> When given a side length and two angles in a non-right triangle, students did not know how to obtain the height and compute the area and/or made a calculation error when computing the area.
F	54	MC	D7	4185	20	*
F	56	MC	D8	4176	50	<ul style="list-style-type: none"> Students confused a line with a slope of zero with a vertical line.
F	57	MC	D10	4187	53	*
F	58	MC	D10	4166	38	*
F	59	MC	D9	4187	66	<ul style="list-style-type: none"> When identifying the equation of the line through two points, students likely did not calculate the

						<p>correct value of the slope.</p> <ul style="list-style-type: none"> When identifying the equation of the line through two points, students made a sign error.
F	60	MC	D9	4179	55	<ul style="list-style-type: none"> When comparing linear equations with same x and y intercepts, students incorrectly obtained the opposite of the y intercept.

Notes:

- (1) A description of the misconception is given when more than 20% of students answered the item incorrectly (i.e. selected a distractor).
- (2) '**N/A**' indicates that fewer than 20% of students answered the item incorrectly. Therefore, no description is provided.
- (3) '*****' indicates that more than 20% of students answered the item incorrectly, but no single distractor was selected by more than 20% of the students. Therefore, no description is provided.