The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2016

Volume 4, Pages 399-408

ICEMST 2016: International Conference on Education in Mathematics, Science & Technology

EXPLORING THE GRAPHS OF FUNCTIONS USING THE JIGSAW APPROACH

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ABSTRACT: Cooperative learning is a strategy that involves students working together towards achieving a common goal. This learning technique can be carried out in various ways and one such method is by the jigsaw approach. In the jigsaw approach, students become experts in a particular concept and then share their knowledge with other group members. The purpose of this study is to investigate how effective the jigsaw approach is in improving students' performance levels in Mathematics, in particular, in the topic of graphs of functions. This mixed method action research study involves two cycles, conducted in two different local government schools in Brunei Darussalam. Cycle 1 involves a Mathematics class of 19 students and Cycle 2 with 25 students, and both at the Year 10 level. A pre-test and post-test design was used for this purpose. Students' perceptions on cooperative learning were also studied. The results of this study suggest that the jigsaw approach does have a positive effect on students' performance levels in Mathematics. Cooperative learning needs to be practiced more in classrooms as it helps in the development of 21st century skills for the students.

Key words: Cooperative learning, jigsaw approach, secondary mathematics

INTRODUCTİON

Mathematics is one of the most important subjects, whose applications play an important role in various fields such as medical, finance and so on. Unfortunately, it is also a subject that has very poor student achievement levels worldwide (Naomi & Githua, 2013). This is further backed up by a study done locally in Brunei Darussalam by Hamid and colleagues (2013). They stated, "Mathematics is one of the challenging subjects in which Brunei primary and secondary school students often perform poorly" (p.1). Mathematics is commonly regarded as one of the most disliked and feared subjects amongst students in schools. They perceive a Mathematics class as boring (Zakaria et al. 2013) and hence dread the lesson. On the contrary, students should learn how to enjoy it and to be more enthusiastic about it. Taking all of these into consideration, one of the most important aspects to focus on when teaching Mathematics is students' engagement. According to Christensen et al. (1991), the act of teaching is the same as getting students to participate in learning. By ensuring that student engagement is taking place during a lesson, we as educators are nurturing them to be active learners. Moreover, students who are engaged are also psychologically invested in learning (Lamborn et al., 1992). In fact, this is actually one of the 21st century skills that are expected from the current generation of students. A similar expectation is being held for the students in Brunei, and is being enforced by the current education reform known as SPN21, which is the acronym for *Sistem Pendidikan Negara Abad ke-21*, and translated to the English Language, the National Education System for the 21st Century of Brunei Darussalam.

One of the main objectives of the SPN21 (Ministry of Education, 2013) is to develop 21st century skills amongst students in Brunei, hence, moulding students to become holistic individuals. Internationally, the importance of

- Selection and peer-review under responsibility of the Organizing Committee of the conference

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21st century skills was brought to everyone's attention when an organisation known as P21, The Partnership for 21st Century Learning was founded in 2002. The Framework for 21st Century Learning (P21.org, 2009) focuses on 3 major areas for student outcomes: Learning and Innovation Skills, Life and Career Skills and Information, Media and Technology Skills. The SPN21 education reform began with a provisional stage of implementation in 2008, whereby only the Year 7 students were targeted (Ministry of Education, 2013). One of the major changes brought about by the SPN21 was in the curriculum and assessment areas. This was seen in the shift of the normal teacher-centred teaching and learning method to a more student-centred teaching and learning method. In the current education world, the traditional chalk-and-talk method is no longer being encouraged in classrooms. Students have to be responsible for their own learning while the teacher only act as facilitator. In other words, students have to be active learners in the classroom.

In order to address the above issue, educators are continuously in search of teaching techniques that not only improve students' understanding but also pique their curiosity and interest towards the subject. A possible way to achieve this is through cooperative learning, which involves a small group of students who work together to achieve a common goal. Students are responsible for both their individual knowledge, and also their groups. This student-centred teaching method or pedagogy can be carried out using a variety of approaches (Damit et al., 2015; Duraman et al., Lim et al., 2015; Sulaiman and Shahrill, 2014, 2015). And one of the approaches is the jigsaw approach. There are certain topics in Mathematics in which students are prone to having misconceptions and difficulties. One such topic is graphs of functions, $y = x^n$.

The Study

The purpose of this study is to investigate the benefits of cooperative learning, in particular, the jigsaw approach, in helping secondary school students to draw and interpret graphs of functions. One's knowledge on graphs starts from the lower secondary years (Year 7 and Year 8), where students are introduced to the Cartesian plane and the axes (Ministry of Education, 2011). In these levels, students learn how to plot points using the x and y coordinates, as well as draw and interprets graphs of straight lines. Students have to be experts in these basic skills in order to successfully draw and interpret graphs of functions, $y = x^n$, where $n > 1$, at higher levels. However, retaining a student who fails to meet the academic requirements in a year level does not necessarily mean that the student will learn concepts better. According to Mundia (2010), repeaters can easily get bored in the class if the teacher does not employ any new and interesting teaching method, also referred to as pedagogy, when teaching a topic. In order to overcome this problem, teachers will have to come up with new pedagogies to improve student learning. They need to find a way to engage students in the lesson, and this can be done using cooperative learning. For the success of this method of learning, students will have to be comfortable with working with each other and discussing ideas. There have been studies conducted locally which claim that learning from group work is indeed effective amongst students. Sulaiman and Shahrill (2014, 2015) found that collaborative learning helped to improve students' performance in Statistics. Cooperative learning also helps students to improve their communication skills, as they are required to discuss their ideas with each other (Lim et al., 2015).

The results from this study will principally be beneficial to its participants. The benefits of cooperative learning have been seen in so many countries and involving students with a range of abilities. A study conducted by Zakaria and colleagues (2010) involving lower secondary students in Miri, Sarawak, Malaysia showed that cooperative learning did have a positive impact on firstly, students' achievement in Mathematics, and secondly, on their attitude towards the subject. According to them, "cooperative learning gives more space and opportunities for students to discuss, solve problems, create solutions, provide ideas, and help each other" (Zakaria et al., p. 274). In addition, by practising cooperative learning in schools throughout Brunei, educators and school leaders are working towards accomplishing one of the main aims of the SPN21, which is, as previously mentioned, to develop 21st century skills amongst the students (Ministry of Education, 2013). A few examples of these demanding skills are communication skills, use of technology (ICT) in learning, collaboration, and critical thinking.

The two research questions guiding this study are how effective is the jigsaw approach in improving students' performance in graphs of functions? And what are the students' perceptions on cooperative learning?

LİTERATURE REVİEW

Cooperative Learning

Cooperative learning is when a group of individuals work together towards achieving a common goal (Smith, 1996; Gillies, 2004). Each group usually has 4 to 6 members, where each and every one of them is responsible for each other's learning. It must be noted that by merely sitting in groups and completing a task does not

necessarily count as cooperative learning (Smith, 1996). According to Johnson et al. (1998), cooperative learning is made up of five basic elements. First, and foremost, is the 'positive interdependence' among students as they are relying on one another for successfully solving a task. Secondly, the assessment of students' knowledge creates 'individual accountability'. Since students are working in groups, they display a 'face-to-face interaction'. Next, the collaboration between students displays interpersonal skills. The final element of cooperative learning involves the way in which groups work to achieve their goals. This includes their time management skills too.

Cooperative learning can be carried out using a variety of approaches, which can be either formal or informal. Özsoy and Yildiz (2004) found that the learning together method was effective in improving primary level students' achievement in Mathematics. The benefits of cooperative learning can be useful to students even outside of the safe environment of school. This pedagogy promotes great leadership, organisational and teamwork skills (Keikhavani et al., 2015). Being talented in these skills will help in the student's social interaction after leaving school. Employers are constantly seeking for these qualities in job applicants, given that collaboration is the current trend in this 21st century. According to Keikhavani and his team, the successful completion of a task creates a sense of excitement for the students. They are motivated to complete any further tasks. This study was done on primary students though, and there was no mention of the academic abilities of the students. Will secondary students with low abilities still share similar feelings? In addition to that, another factor to consider is the possibility of there being a language barrier.

Jigsaw Approach

In 1971 Professor Aronson and his graduate students invented the jigsaw strategy (Aronson, 2000). This approach is a cooperative learning method whereby each student belongs to two main groups: 'home' group and the 'expert' group. A lesson incorporating this method will begin with the teacher assigning 4 to 6 students in a group, and given a task made up of different segments. This is usually a heterogeneous group so as to have diversity in terms of student backgrounds, gender, and ethnicity. Each student in the home group is then assigned as an expert of each segment. Next, experts from each home group will discuss with students who share the same expertise as them. Students in each expert group will discuss the ways to solve the segment of the task assigned to them. Once this is done, experts return to their home group and share their knowledge with the rest of the group members. A visual representation of the jigsaw approach, taken from Reilley (2010) is shown in Figure 1 below.

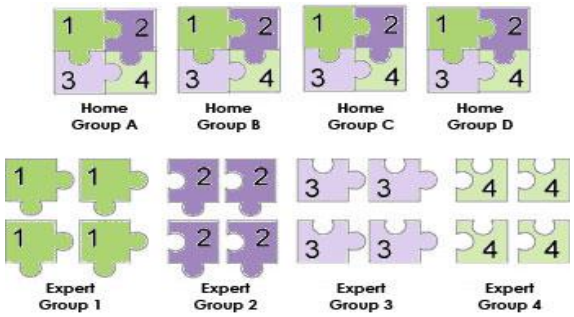

Figure 1. Jigsaw Group Diagram (taken from Reilley, 2010)

An analysis of the different cooperative learning strategies have shown that one of the reasons for the effectiveness of the jigsaw approach is due to the precise methods (Johnson et al., 2000) involved in achieving the common goal. One of the benefits of this approach is that students are responsible for their own learning. It also encourages student-student interaction and therefore helps in the development of their inter-personal skills (Adams, 2013). A study conducted by Zakaria and his colleagues (2013) in Indonesia showed that secondary school students preferred using the jigsaw approach to learn Mathematics. Moreover, these students enjoyed helping each other to learn. This implies that the jigsaw approach can have a positive effect in the development of good collaboration and teamwork skills. Additionally, according to a study involving Vietnamese higher education students (Van Tran, 2012), the students generally did not have anything to dislike about the jigsaw approach.

Students' Misconceptions on Graphs

You and Wiest (2009) conducted a study to investigate how students interpret graphs. According to them, students can have either an iconic interpretation or a symbolic one, where the former means that a graph is seen as how the text is worded whereas the latter means that the graph is seen abstractly. The results showed that a high percentage of seventh grade students had an iconic interpretation of graphs. Symbolic interpretation was

seen mostly in adults. This tells us that the seventh graders lack in exposure to real-world models, as opposed to the adults. Therefore, it is essential that teachers incorporate real-world examples in their Mathematics lesson.

The use of activities in the classroom also helps in students' understanding of graphs (Wallace-Gomez, 2014). One of the suggested activities was to turn the classroom into a living graph, where a classroom of students seated in single rows is divided into the four quadrants of the Cartesian plane. A point (x, y) therefore represents the seating position of each student. By carrying out such activities, students become attentive, and are focused and engaged in the lesson. They become active learners in the classroom and this will in turn help their understanding of the lesson content (Freeman et al., 2014).

METHODS

A mixed method approach was employed for this research. By performing both methods, there is more information at hand to answer the research questions (Moss, n.d.). This study involves two cycles, conducted in two different local government schools in Brunei Darussalam. Cycle 1 was conducted in a school in the Brunei-Muara District, hereby referred to as School A. Whereas Cycle 2 was carried out in another school, namely School B, in the Belait District. The two schools are about 100 km apart. This was done to further test the effectiveness of the jigsaw approach. Both cycles were conducted using the same instruments and materials. The Year 10 students were chosen for both cycles since both schools covered the topic of graphs of functions at this level.

In Cycle 1, a convenience sample of 19 students of a mixed academic ability was selected. This sample consisted of 5 boys and 14 girls. This was an easy sample to get within the time frame available for the study (Marshall, 1996). For Cycle 2, the only sample available in School B to take part in the study was a sample of 25 students, of which 16 were boys and 9 were girls. Similar to the sample in School A, the majority of these students had an average to low Mathematical ability.

Instruments

The first research question was to see how effective the jigsaw approach was in the students' performance. In order to answer this question, test scores will be collected and analysed. This was done by means of a pre-test – post-test design, wherein intervention lessons were conducted between the two tests. Additionally, individual feedback was collected from each and every student who participated in the study. Feedbacks from each student were recorded since the sample size was very small. This was done after the post-test.

Data Collection and Analysis

Prior to collecting any data for the study, permissions were sought from the relevant authority agencies. Consent forms from the participants' parents or guardians were also collected. Before conducting the pre-test, discussions were done with the teachers responsible for teaching the topic of graphs of functions to the selected samples. In both School A and School B, the respective teachers carried out their lessons by means of a traditional, teacher-centred pedagogy. A pre-test (refer to Appendix 1) was then designed for the sample to assess their performances on the chosen topic. Checking the validity of the test questions were sought from the teachers. Besides that, the Mathematics school syllabus and past-year examination papers were also used as guidance. The students had one hour to complete the pre-test individually.

Next, an intervention lesson was planned. This lesson incorporated the application of the jigsaw approach to tackle the issues that surfaced from the results of the pre-test. As mentioned before, the jigsaw approach focuses on a student being an expert in a particular content or part of a question (part of a jigsaw puzzle), and after discussing with fellow expert group members, he or she shares this knowledge with fellow home team members to solve the whole question (jigsaw puzzle). Figure 2 below shows the task used for the intervention lesson.

The task consisted of five parts, each covering a particular content area of the topic of graphs. Therefore, each 'home' group had to be made up of 5 'experts'. With the help of the class' name list, the first author assigned members of both the 'home' groups and 'expert' groups. This was to avoid any preference between the students. Before conducting the lesson, students were briefed on the jigsaw approach and how it works. The entire duration of the intervention lessons was 2 hours. This was broken down into 3 sessions. The first 30 minutes was used for discussion with the 'expert' groups. The next 45 minutes was used for discussion with the 'home' group. During these discussions, the first author continuously walked around the class to monitor students' behaviours and to offer any assistance if needed. Finally, the last 45 minutes was used for the sharing of solutions between the 'home' groups. Each 'home' group had a team leader who would explain his group's solutions to the rest of the class. This was where the first author had to step in as a teacher if the solutions or

explanations were incorrect. Mistakes were corrected on the spot so as to clear any misconceptions amongst the students.

Question

$y = x\,(x + 2)\,(x - 3)$

x	- 2.5	- 2	- 1	0	1	2	3	4
y	p	0	4	0	- 6	- 8	0	q

1. Find the values of p and q.
2. Draw the graph of $y = x\,(x + 2)\,(x - 3)$ for $-2.5 \le x \le 4$, where 1 cm represents 1 unit on the x-axis and 1 cm represents 5 units on the y-axis.
3. From the graph, find the maximum and minimum points of the graph.
4. Find the gradient of the graph at (3 , 0).
5. Draw the graph of $y = 2^x$ for $-2.5 \le x \le 4$ on the same axes. Use your graph to solve the equation:

$x\,(x + 2)\,(x - 3) = 2^x$.

Figure 2. The Task during the Intervention Lesson

Once these sessions were over, a post-test (refer to Appendix 1) was conducted. Similar to the pre-test, the students had one hour to complete the post-test individually. In order to assess the performances of the students, the mean scores of the pre- and post-tests were then compared. A simple t-test was conducted to test the level of significance of the results.

1. What do you think cooperative learning is? Have you done it before?
2. How do you feel about it?
3. How do you find the topic of graphs of functions?
4. You had a chance of learning graphs of functions using the jigsaw approach, how did you find the lessons?
5. Did learning through the jigsaw approach help your understanding on graphs of functions?
6. How would you feel if the jigsaw approach was applied to other topics or subjects?

Figure 3. The Questions Listed in the Student Feedback Form

Moreover, the student perceptions on the jigsaw approach and cooperative learning were collected using the student feedback form (refer to Figure 3). Students had to answer 6 open-ended questions. These questions were based on the jigsaw approach of cooperative learning and whether or not it helped them in the topic of graphs of functions. In order to express themselves clearly, students were given the freedom to answer these questions in both the Malay and/or English Languages.

RESULTS and DİSCUSSİONS

In order to investigate the effectiveness of the jigsaw approach in the students' performances, test scores were compared and analysed using the IBM SPSS Statistics version 22.0 software. A paired samples t-test was conducted, where the confidence interval was at 95%. Therefore, a p value of less than 0.05, that is, $p < 0.05$, meant that the result obtained was significant and not merely by chance.

Table 1. Paired Samples Statistics for Cycle 1

	Mean	N	Std. Deviation	Std. Error Mean
Pre-test	4.737	19	3.070	.704
Post-test	6.158	19	3.500	.803

From Table 1, we can see a slight improvement in the students' performances from Cycle 1. For the pre-test, the mean test score calculated was 4.737, whereas the mean test score of the post-test has increased to 6.158. However, this improvement did not necessarily mean that the intervention lesson (the jigsaw approach) had effectively improved the students' scores.

Table 2. Paired Samples Test for Cycle 1

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test – Post-test	-1.42	2.735	.627	-2.739	-.103	-2.265	18	.036

Table 2 shows us that the *p* value is 0.036, which is less than the significance level of 0.05, and hence is considered significant. Therefore, this result suggests that the jigsaw approach does indeed have a positive effect on the students' performances.

Table 3. Paired Samples Statistics for Cycle 2

	Mean	N	Std. Deviation	Std. Error Mean
Pre-test	4.360	25	2.531	.506
Post-test	6.160	25	2.882	.576

Table 4. Paired Samples Test for Cycle 2

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test – Post-test	-1.800	1.683	.337	-2.495	-1.105	-5.347	24	.000017

From Tables 3 and 4 are the results for Cycle 2, and we can see that the difference between the mean scores of the post-test and the pre-test is 1.800. This shows a better improvement in the students' performances, as opposed to that in Cycle 1, where the difference in mean scores was 1.421. By conducting a paired samples t-test, a *p* value of 0.000017 was obtained. Since *p* is less than 0.05, the result obtained is significant. Therefore, the improvement in students' performances is not just by chance, and could have been due to the intervention session conducted between the two tests. In short, the jigsaw approach had a positive effect on the performance level of the students.

The students' feedback for each of the 6 open-ended questions (refer to Figure 3 above) were categorised into 3 different aspects, which are 'positive feelings', 'negative feelings' and finally 'mixed feelings'. Based on the feedback obtained from the students in School A where Cycle 1 of the study was conducted, a majority of them were aware of what cooperative learning is. This was because they were exposed to it before in subjects other than Mathematics. Only 3 out of the 19 students (15.8%) disliked cooperative learning. The third question asked students about their thoughts on the topic of graphs of functions. Half of the sample expressed positive feelings for the question. The subsequent question asked for the students' opinions on the intervention lesson conducted using the jigsaw approach. Each and every one of them gave positive feedback on this teaching strategy. The students enjoyed the lesson. A few of them went on to say that they preferred working in their 'Home' groups. Unfortunately, no reasons were given. All but one student stated that the jigsaw approach helped to improve their understanding of the topic of graphs of functions. The latter had no answer for the question. Lastly, 57.9% of the students stated that they would like to use the jigsaw approach in other topics and subjects and 15.8% of them disagreed. Meanwhile, the remaining students expressed mixed feelings for this question, stating that it depends on the topics.

Similarly, students in School B, for Cycle 2, also responded to the questions in the feedback form. All of the students in the sample were exposed to cooperative learning before the study was conducted. According to them, cooperative learning means teamwork and working in groups. Out of the 25 students, only 64% of them gave positive feedback regarding their experience with cooperative learning, while 20% of the students disliked working in groups. The remaining 16% of students were unsure whether they enjoyed the experience or not.

Unlike the sample in Cycle 1, the majority of the students in this sample find the topic of graphs of functions difficult. When asked about their experience of using the jigsaw approach to learn graphs of functions, 56% of the students gave positive feedback, 20% gave negative feedback and the remaining 24% were unsure. Some of the students' feedback can be seen in Table 5 below.

Table 5. Students' Responses about Learning Graphs using the Jigsaw Method

Question 4	You had a chance of learning graphs of functions using the jigsaw approach, how did you find the lessons?
Student 1	It was fun learning with my home and expert groups. They were very cooperative.
Student 2	Sometimes it's easy and sometimes it's not.
Student 3	I'm still confused with it even after the home group and expert group.
Student 4	It was difficult.

When asked if the jigsaw method improved their understanding of graphs of functions, 60% of the students stated that it did, while 24% of them disagreed. Last but not least, 68% of the students gave positive feedback about applying the jigsaw approach in other topics or subjects. Out of the 16% of students who gave negative feedback, one of them preferred individual work instead of working in groups.

CONCLUSIONS

As mentioned earlier, the study comprised of two cycles, Cycle 1 and Cycle 2. These cycles were conducted in School A and School B respectively. We investigated the effect of the jigsaw approach in students' performances in graph of functions. And this was done by means of a pre-test – post-test design. Based on the results obtained from Cycle 1 and Cycle 2, we can conclude that the jigsaw approach does have a positive effect in improving the students' performance levels. In both cycles, the difference in the mean scores between the pre-test and post-test were significant. Furthermore, this improvement in the students' performance levels happened despite the absence of any real-world examples.

Subsequently, we also investigated the students' perceptions on cooperative learning. Students were requested to fill in the student feedback form. More than half of the sample size in each cycle gave positive feedbacks on cooperative learning and the jigsaw approach. However, not everyone was keen on and comfortable with working in groups. Unfortunately, this is not a satisfactory result. With the focus now on student-centred teaching and learning, it is vital for students to be willing to try new learning strategies.

The SPN21 education reform in Brunei envisages developing the 21st century skills in students. A possible reason for the lack of enthusiasm amongst students when asked about working in groups could be due to the lack of familiarity. Therefore, it is the duty of the teachers to expose students to new pedagogies, which will help in the development of the sought after 21st century skills. In order to carry out such teaching and learning strategies effectively, the teachers should be well accustomed and trained beforehand. Also, it is essential for teachers to realise the importance of students being responsible for their own learning. As educators, we must refrain from the traditional 'spoon-feeding' culture, as this teaching method fails to encourage students to become independent learners (Dehler & Welsh, 2014).

Finding real-world examples to help students in their learning can be a challenging task. However, the results of this study show that it is not always necessary to incorporate real-world problems. With the help of teaching strategies such as the jigsaw approach, students can still learn difficult concepts such as graphs. Educators can apply this approach to various other Mathematics topics to improve the students' performance levels.

Limitations of the Study

For this study, the sample size for Cycle 1 was 19 students and for Cycle 2 was 25 students. These are small-scale samples since other classes in both the schools were not available. Furthermore, both cycles were conducted in local government secondary schools and therefore cannot be used to generalise all secondary school students in Brunei. This is due to the possible difference in teaching and learning environments in the non-government schools. Furthermore, this study only focused on the application of the jigsaw approach in learning the topic of graphs of functions, one of the many Mathematics topics in the syllabus.

Apart from that, the language barrier also proved to be a slight problem. Although English Language is widely used in Brunei, it still is not the students' first language. Since Mathematics is an English medium subject, the tests and intervention lessons were conducted in English. However, the focus of this study was on the effectiveness of the jigsaw approach. The main aspect of this particular learning technique is that students need to share their knowledge and explain their solutions to their group members clearly. Therefore, in order to support discussions amongst the participants in the study, the students were allowed to discuss bilingually, that is, in both the Malay and English Languages.

RECOMMENDATIONS

This study was conducted in only two government secondary schools. Future studies can be done by means of comparisons between government schools and private schools, since both the learning environments might differ from each other. Also, the main focus of this study was on the topic of graphs of functions. Further research on the effectiveness of the jigsaw approach can be done on other Mathematics topics at different levels. It is possible that younger students would perceive cooperative learning differently compared to the sample selected for this study.

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APPENDIX 1
The Pre- and Post-Tests

1. (a) Plot the graph $y = x^2$ for values of x from -2 to 2.
   (b) By adding a suitable straight line to your graph, solve each of the following:
   (i) $x^2 = 2.5$ (ii) $x^2 - x = 1$

2. The variables x and y are connected by the equation $y = 1 + 2x^2 - x^3$.

The table below shows some values of x, and the corresponding values of y, correct to 1 decimal place where appropriate.

x	-1	-0.5	0	0.5	1	1.5	2	2.5
y	4	1.6	1	1.4	2	2.1	1	*q*

(a) Calculate q, give your answer correct to 1 decimal place.
(b) Using a scale of 2 cm to represent 1 unit on both axes, draw a horizontal x-axis for $-2 \leq x \leq 3$, and draw a vertical y-axis for $-3 \leq y \leq 5$. On your axes, plot the points given in the table and join them with a smooth curve.
(c) Use your graph to find all the solutions of $1 + 2x^2 - x^3 = 2$.
(d) By drawing a tangent, find the gradient of the curve at the point where x = -0.5.
(e) By drawing an appropriate straight line on the grid, solve the equation $1 + 2x^2 - x^3 = x$.

3.

x	1	1.5	2	3	4	5	6	8
y	8	5.3	4	2.7	2	1.6	1.3	1

The given table of values is for $y = \frac{8}{x}$.

(a) Using a scale of 2 cm to represent 1 unit on each axis, draw the graph of $y = \frac{8}{x}$ for the given values.
(b) On the same axes, draw the line of symmetry for your graph.
(c) Find the gradient of the straight line joining (1, 8) and (4, 2).

4. Identify a possible graph for the equation $y = (x - 1)^2 - 1$