Flagstone State Community College

Year 12
Draft #1 Due Date:
Draft #2 Due Date:
Final Due Date:
Name:

Mathematics A

Semester 3 Assignment

Semester 3, 2013
Duration: 3 weeks

Knowledge & Procedures

<table>
<thead>
<tr>
<th>Question</th>
<th>Standard Achieved</th>
<th>K &amp; P Standard Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Question 2a</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Question 2c</td>
<td>B</td>
<td></td>
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<tr>
<td>Question 3a</td>
<td>B</td>
<td></td>
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<tr>
<td>Question 4a</td>
<td>A</td>
<td></td>
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</table>

Modelling & Problem Solving

<table>
<thead>
<tr>
<th>Question</th>
<th>Standard Achieved</th>
<th>M &amp; P Standard Awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 2d</td>
<td>C</td>
<td></td>
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<tr>
<td>Question 3b</td>
<td>B</td>
<td></td>
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<tr>
<td>Question 4b</td>
<td>A</td>
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</tbody>
</table>

Communication & Justification

C & J Standard Awarded
Structure & Grades

This assignment is marked according to 3 criteria types (which are given in detail on the next page.)

1) Knowledge and Procedures. (K & P)
2) Modelling and Problem Solving (M & P)
3) Communication and Justification. (C & J)

- In order to achieve the highest possible marks you should carefully read the criteria sheet and the items below.
- Not all criteria are used for each question. The criteria sheet is shown on the next page.
- It is not possible to achieve an A standard by just getting the A standard question correct. The lower standard questions must also be correct. So to achieve an A standard in say, Knowledge & Procedures for this assignment you will also have to achieve the B, C & D standards from the questions indicated as B, C & D standard questions.
- A question’s standard shows the highest standard achievable from that question. It is also possible to get lower standards from that question. So for a standard A question it may be possible to get a B, C, D or E. **So be sure to attempt all questions even if you don’t think you can do it.**
- If you achieve standards C and A for Modelling and Problem Solving but not standard B, then the A will move down to fill the B position and you will be awarded a B standard.
- These substituting higher achieved standards for lower not achieved standards will occur in the Knowledge and Procedures and Modelling and Problem Solving criteria.
- The Communication and Justification criteria are judged from all questions. The standard awarded will be the highest consistently achieved standard.

QCS Alignment

This assignment is presented in a format that is similar to that of the Queensland Core Skills tests, and identifies the following *Common Curriculum Elements (identified by italics):*

- Calculation with or without a calculator
- Interpretation of the meaning of tables and diagrams
- Substitution into formulas
- Identifying shapes in two and three dimensions
- Perceiving patterns
- Visualising
- Classifying

In general your setting out should show

(i) the progression of steps, and
(ii) the structure of the mathematical argument(s) used to achieve your answers.

All of your setting out and answers should display the use of

(i) appropriate mathematical words and symbols, and
(ii) correct spelling, punctuation and grammar.
<table>
<thead>
<tr>
<th>K&amp;P</th>
<th><strong>Standard A</strong></th>
<th><strong>Standard B</strong></th>
<th><strong>Standard C</strong></th>
<th><strong>Standard D</strong></th>
<th><strong>Standard E</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>• accurate use of rules and formulas in simple through to complex situations</td>
<td>• accurate use of rules and formulas in simple situations or use of rules and formulas in complex situations</td>
<td>• use of rules and formulas in simple routine situations</td>
<td>• use of given rules and formulas in simple rehearsed situations</td>
<td>• attempted use of given rules and formulas in simple rehearsed situations</td>
</tr>
<tr>
<td>ii</td>
<td>• application of simple through to complex sequences of mathematical procedures in routine and non-routine situations</td>
<td>• application of simple sequences of mathematical procedures in non-routine situations or complex sequences in routine situations</td>
<td>• application of simple sequences of mathematical procedures in routine situations</td>
<td>• application of simple mathematical procedures in simple rehearsed situations</td>
<td>• attempted use of simple mathematical procedures in simple rehearsed situations</td>
</tr>
<tr>
<td>iii</td>
<td>• appropriate selection and accurate use of technology</td>
<td>• appropriate selection and accurate use of technology</td>
<td>• selection and use of technology</td>
<td>• use of technology</td>
<td>• attempted use of technology</td>
</tr>
<tr>
<td>iv</td>
<td>• use of strategies to model and solve problems in complex routine through to simple non-routine situations</td>
<td>• use of strategies to model and solve problems in routine through to simple non-routine situations</td>
<td>• use of familiar strategies for problem solving in simple routine situations</td>
<td>• use of given strategies for problem solving in simple rehearsed situations</td>
<td>• attempted use of given strategies for problem solving in well-rehearsed situations</td>
</tr>
<tr>
<td>v</td>
<td>• investigation of alternative solutions and/or procedures to complex routine through to simple non-routine problems</td>
<td>• investigation of alternative solutions and/or procedures to routine problems</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>vi</td>
<td>• informed decisions based on mathematical reasoning in complex routine through to simple non-routine situations</td>
<td>• informed decisions based on mathematical reasoning in routine situations</td>
<td>• informed decisions based on mathematical reasoning in simple routine situations</td>
<td></td>
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<tr>
<td>vii</td>
<td>• reflection on the effectiveness of mathematical models including recognition of the strengths and limitations of the model</td>
<td>• recognition of the strengths and limitations of the model in simple situations</td>
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<td></td>
<td></td>
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<tr>
<td>viii</td>
<td>• accurate and appropriate use of mathematical terminology and conventions in simple non-routine through to complex routine situations</td>
<td>• accurate and appropriate use of mathematical terminology and conventions in simple non-routine and/or complex routine situations</td>
<td>• appropriate use of mathematical terminology and conventions in simple routine situations</td>
<td>• use of mathematical terminology and conventions in simple rehearsed situations</td>
<td>• use of mathematical terminology or conventions in simple rehearsed situations</td>
</tr>
<tr>
<td>ix</td>
<td>• organisation and presentation of information in a variety of representations in simple non-routine through to complex routine situations</td>
<td>• organisation and presentation of information in a variety of representations in simple non-routine and/or complex routine situations</td>
<td>• organisation and presentation of information in a variety of representations in simple routine situations</td>
<td>• presentation of information in simple rehearsed situations</td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>• analysis and translation of information displayed from one representation to another in complex routine situations</td>
<td>• analysis and translation of information displayed from one representation to another in simple routine situations</td>
<td>• translation of information displayed from one representation to another in simple routine situations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xi</td>
<td>• use of mathematical reasoning to develop logical sequences in simple non-routine through to complex routine situations using every day and/or mathematical language</td>
<td>• use of mathematical reasoning to develop logical sequences in simple non-routine and/or complex routine situations using every day and/or mathematical language</td>
<td>• development of logical sequences in simple routine situations using every day and/or mathematical language</td>
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<tr>
<td>xii</td>
<td>• justification of the reasonableness of results obtained through technology or other means</td>
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Managing Money

Compound Growth

**Question 1**  (K&P Standard C)

A computer virus has started to infect computers around the world. The virus started from just one computer and is spreading at a rate of 28% per hour. If the virus remains uninterrupted:

a) How many computers will it have infected by the end of the day?

b) How many will it have infected by the end of the second day?

c) How long will it take to infect the worlds’ 500 000 000 computers?

Retirement Savings

**Question 2**

Adam was born in 1984 and since he was 20 years old he has been paying $180 per month into a superannuation fund and will continue paying this same amount until he retires. He expects to receive $1 100 000 when he retires in 2044 and plans to withdraw the money into his everyday account which earns no interest. This payout is the amount of money Adam expects to live off until he dies. His current (2013) average cost of living is $600/week. Assume that his needs are not expected to change in future years. The average lifespan of an Australian male is 79 years.

If inflation averages 3.2% over the period of time he has been making investments:

(K&P Standard C)

a) How much will Adam have contributed into the fund over the whole period?

b) What is the value of the payout at the start of his contributions in 2004?

(K&P Standard B)

c) Determine whether Adam is likely to have enough money for his retirement by performing mathematical modelling (a table is recommended).

(M&PS Standard C)

d) Make a comment about the amount of money he is going to use for his retirement.

Do you think this will be enough? What advice would you give Adam?

*(Note: Your comments should be based on your calculations)*
Reference Material

Paul Clitheroe is a founding director of financial planning firm ipac, chairman of the Financial Literacy Foundation and a financial columnist for many publications. A column that he writes for the “Your Money” liftout of the Sunday Mail includes advice for the ‘mums and dads’ who would like to stretch their money further. He has been known to make the comment that armed with a little more knowledge, we could have greater returns on our investments.

Below is a quote from Paul Clitheroe:

“It’s surprising how often we let money slip through our hands simply because we don’t take the time to select the right financial product. Research shows that by using an inappropriate deposit account we could be out of pocket by $900 per year.”

Paul Clitheroe, Chief commentator for Money Magazine

Through this second part of the assignment you will investigate the effect of compound interest. You will produce a short report detailing the information you have found. The second task of this assignment asks you to compare deposit accounts from two reputable banks and to make an informed decision as to which would be the better investment.
Compounding Comparison

Question 3

(K&P Standard B)

a) You are required to calculate the amount of interest you would get by investing $100 000 at 6% compound interest over 2 years. You will be making four calculations where you will use different rest periods: annual, monthly, weekly or daily. In each case, add the interest into the account when it is paid. When you have completed the calculations, compare the total interest that you get from the varying rest periods. Draw a graph showing the number of rests in 1 year on the horizontal axis and the amount of interest on the vertical axis.

(M&PS Standard B)

b) With reference to the calculations you have made and the graphs you have produced, write a short report discussing the effect of more frequent payments of compound interest at the same nominal rate. Include in your discussion a comment on which investment would be better: 8.7% compounded daily or 9.0% compounded annually and compare the effective interest rates.

Term Deposits

Question 4

(K&P Standard A)

a) You have received $25 000 and have decided to invest this money for 5 years in an interest bearing account. You are to:

i) Compare term deposits from each of the following banks, and

ii) Choose one to invest your $25 000.

<table>
<thead>
<tr>
<th>Bank</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Australia Bank</td>
<td><a href="http://www.nab.com.au">www.nab.com.au</a></td>
</tr>
<tr>
<td>Commonwealth Bank</td>
<td><a href="http://www.commbank.com.au">www.commbank.com.au</a></td>
</tr>
<tr>
<td>Westpac</td>
<td><a href="http://www.westpac.com.au">www.westpac.com.au</a></td>
</tr>
</tbody>
</table>

Note: You must justify your selection by calculating and comparing the total income of each bank’s 5-year term deposit after maturity. You should also justify your selection of rest period (i.e. how frequently the interest is paid). Remember to check whether the interest paid is compounding (i.e. whether it is paid into the term deposit account at the end of each rest period).

(M&PS Standard A)

b) Comment on the wisdom of the advice from Paul Clitheroe about achieving the highest return on your investment. Include details about the difference between the highest and lowest yield from the term deposits that you have investigated. Also, discuss whether it is worth spending the time to fully investigate the differences between different banks’ term deposits if you actually had $25 000 to invest.