Appendix E:
Video evaluation questionnaire

Video Evaluation Questionnaire

Student number: ________________

1. I did not use the video/video workbook. ☐ If you tick this block, please ignore the questions that follow.

2. Rate the different components of the video/video workbook, by circling one of the numbers (from 1 to 4) in each case, where

1	represents	**not at all helpful**
2	represents	**helped a little**
3	represents	**helped me quite a lot**
4	represents	**helped me very much**

Introduction	1	2	3	4
Segment 1 (Text Type and Structure)	1	2	3	4
Segment 2 (Anaphoric References)	1	2	3	4
Segment 3 (Causal Relations)	1	2	3	4
Segment 4 (Contrastive Relations)	1	2	3	4
Segment 5 (Tables)	1	2	3	4
Segment 6 (Graphs)	1	2	3	4
Segment 7 (Problem Solving: Putting it all together)	1	2	3	4
Video Workbook Activities	1	2	3	4

---

3. Circle either 'yes' or 'no' in response to each of the following statements.

3.1 I only used the video workbook.	Yes / No
3.2 I used the video and referred to the video workbook in order to do the activities.	Yes / No
3.3 I watched parts of the video more than once.	Yes / No
3.4 The video/video workbook has helped me 'read to learn' better.	Yes / No

4. In my opinion, the best aspect of the video/video workbook is:

5. In my opinion, the worst aspect of the video/video workbook is:

6. Please write down anything in particular about the video/video workbook that you would like to comment on.

Appendix F:

'Diagnostic test' of reading ability, included in Assignment 1, 2003

PART 2
FIRST READ THE SECTION IN THE BOX BELOW.

Instructions

- **Read the passage**
  Read the passage **once** at the rate at which you normally read, i.e. the speed with which you feel comfortable and that enables you to understand the passage. DO NOT skip parts of the text, because you need to answer questions on it afterwards.

- **Time yourself** accurately with a watch that indicates seconds (if possible). On the tear–off pages in the assignment, note the time you start reading and the time you finish the passage, and then calculate the time it took to read the whole passage.

- **Answer the questions**
  When you have read the passage once, carefully, try to answer the questions that follow the passage. Once again, write down the time you start answering the questions and the time you finish, and calculate the time it took you to complete answering all the questions.

Mountain bike mathematics [1]

(Note that the paragraph numbers are required by the questions that follow.)

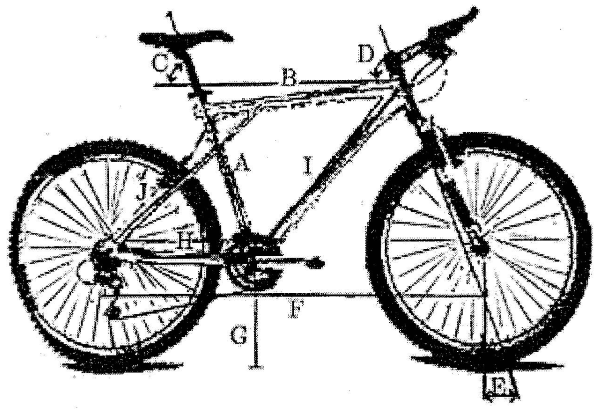
1. Mountain biking is a relatively new activity that has become increasingly popular in the past two decades. The first mountain bikers began adapting bicycles that were available for off road use. At that time bicycles were not yet equipped with fat knobbly tyres, straight handlebars, or gear shifters on the handlebars. In general, bikes were extremely heavy and impossible to ride uphill. Descents presented a different problem. Rapid speeds caused brake grease to turn to liquid and run out. Over the years, technological, social and economic factors have helped make mountain bikes the best selling adult bicycles in many countries.

2. Today, mountain biking is a popular recreational activity as well as a sport dependent on technological advances. Mountain bikes may have combinations of up to 21 gears. These are essential for travelling uphill, downhill and over various ground surfaces including rock, sand, and mud. As a form of exercise, mountain biking is an excellent cardiovascular activity requiring strength, balance, endurance and skill. Like mathematics, mountain biking is a culture complete with its own set of rules and terminology.

[1] Adapted from the article on "Mountain bike mathematics", by Vivian Knowles, reported by Paul Laridon and Norma Presmeg, in *Pythagoras* 46/47, August/December 1998.

3. The purpose of this article is to identify some of the mathematical concepts that are related to mountain bikes. Two main areas will be explored, namely the geometry of the mountain bike frame and the combinations of gears and their effectiveness.

4. Mountain bike frames are geometric in shape. The rims and tyres of the bicycle are circles. Spokes arranged in specific patterns connect the centre of the wheel axle to the rim. Rims and spokes can be thought of as the circumference C and radii r of a circle, linked by the formula $C = 2\pi r$. The basic frame design is based on the use of triangles. The triangular design of the frame, as we see in Figure 1, gives it strength and rigidity.



A.	Seat tube	F.	Wheel base
B.	Top tube	G.	Bottom bracket
C.	Seat tube angle	H.	Chainstay
D.	Headset tube angle	I.	Down tube
E.	Trail (The length of this line is called the trail value.)	J.	Tube connecting seat tube to chainstay

Figure 1: Parts of the frame

At least two triangles are visible. The largest is made by the lines of the seat tube, top tube and down tube. The second largest is made by the lines of the seat tube, chainstay, and the tube connecting these. The measures of these and others, along with the angle measures of the seat tube and headset tube, vary slightly among mountain bike frames. The size of the bike is determined by the height of the seat tube that should correspond to the rider's inseam. Longer top tubes offer more stability and comfort. Seat tube angles of 69 to 71 degrees offer more comfort, while angles greater than these provide greater agility and climbing ability. Headset tube angles are related to steering ability.

The greater the angle, the more sensitive the steering. The bigger the value of E, the easier it is to steer, while smaller values of E provide quicker reactions. Long wheel bases are better suited for easy handling while short wheel bases are more sensitive and lively. Lower bottom brackets allow greater manoeuverability while higher ones create stability, better straight ahead steering and greater ability to clear obstacles. Longer chainstays are related to comfort while shorter ones relate to good climbing ability.

5. Mountain bikes for adults usually have 18 or 21 speeds. These speeds are made possible by the arrangement of chain rings and sprockets that make up the gears. A typical mountain bike may have 3 chain rings and 6 or 7 sprockets. The total number of possible gear combinations can be determined by multiplying the number of chain rings by the number of sprockets. For example, a recreational bike (GT Rebound) examined for this project has 3 chain rings and 6 sprockets, giving a total of 18 gears.

6. Each chain ring and sprocket has a specific number of teeth. A gear ratio is a comparison of the number of teeth on the ring, to the number of teeth on the sprocket on which the chain is attached. Thus, if we consider a specific bike in which the chain is located on a chain ring with 48 teeth and on a sprocket with 18 teeth, then the gear ratio could be expressed as 48/18. The bicycle rider may choose gear ratios by shifting gears using gear shifters that are located on the handlebars close to the hand grips.

7. Understanding the patterns and relationships of gears helps with their application on a mountain bike trail. High gears require more effort when pedaling. They are best for descending. They are not effective for ascending. Low gears allow ease in pedaling while climbing.

Answer the following questions on the passage

Fill in your answers in the spaces provided. You may need to refer to the passage several times as you answer the questions. Please cut out these pages and include them in your assignment.

Reading Speed:

Starting time: ....

Finishing time: ....

Total time: ....

Answering Questions:

Starting time: ....

Finishing time: ....

Total time: ....

For Questions 1 – 8, choose the **most appropriate** answer by putting a cross (X) next to the letter that represents your answer.

1. The main purpose of this article is to:

   (a) show how complicated mountain bikes are.

   (b) describe how the frame is designed and how the system of gears on a mountain bike works.

   (c) identify some of the mathematical principles underlying mountain bikes.

   (d) give the reader a clear idea of what the mountain bike looks like and how it functions.

2. As a sport, mountain biking has become popular since

   (a) the 1960s.

   (b) the 1970s.

   (c) the 1980s.

   (d) the 1990s.

3. In early mountain bikes, travelling downhill was difficult because

   (a) the bicycles were too heavy.

   (b) the speed of descent made brake grease too sticky.

   (c) the speed of descent was so rapid that cyclists would fall off.

   (d) the grease in the braking system became less effective.

4. The article says that mountain biking is an "excellent cardiovascular exercise". This means that it is good exercise for

   (a) the heart and blood vessels.

   (b) the muscles and lungs.

   (c) the overall body.

   (d) the arm and leg muscles.

5. Rigidity refers to the quality of being

   (a) flexible.

   (b) strong.

   (c) unbendable.

   (d) fast.

6. The spokes of the bicycle

   (a) connect the wheel axle to the tyre.
   (b) are always arranged in the same pattern.
   (c) connect the rim to the centre of the wheel axle.
   (d) are arranged in groups of parallel lines.

7. What kind of chainstay would be best for going uphill?

   (a) A longer chainstay.
   (b) A shorter chainstay.
   (c) A steeper chainstay.
   (d) A more flexible chainstay.

8. Suppose you were asked to insert a subheading between Paragraphs 3 and 4. Which of the following headings would be appropriate?

   (a) Mountain bike types
   (b) Frame geometry
   (c) The effectiveness of the mountain bike
   (d) Gear ratios and their application

For Questions 9 – 14, fill in your answers in the spaces provided.

9. In the article we read that "mountain biking is a popular recreational activity as well as sport dependent on technological advances". Name two technological advances mentioned in the article that made bicycles more effective for off road use.

   ....

10. Suppose you were asked to insert a subheading entitled **Gear ratios** into the text. Between which paragraphs would you insert it?

    Between paragraphs .... and ....

11. Name two design features which relate to making a mountain bike more comfortable.

    (a) .... (b) ....

12. If a typical mountain bike has a gear ratio of 36/12, how many teeth will the chain rings have and how many teeth will the sprockets have?

    Number of teeth on chain rings: .... Number of teeth on sprocket: ....

13. Which lines make up the biggest of the triangles that contribute to the shape of the frame?

....

14. In the article it is claimed that "like mathematics, mountain biking is a culture complete with its own set of rules and terminology".

Give two examples of mountain biking **terminology**.

....

....

PART 3

Follow the instructions in each case.

Section 1

FIRST READ THE SECTION IN THE BOX BELOW.

Instructions

- **Look at the following example very carefully:**
  Several words have been underlined in the paragraph below. Each of these numbered words refers back to other words/phrases/sentences in the paragraph, which have been printed in italics and put into boxes. A table has been set up to show the links.

  A computer, like any other machine, is used because <u>it</u> (1) does certain jobs better and more proficiently than humans. <u>It</u> (2) can receive *more information* and process <u>it</u> (3) faster than any human. The speed at which a computer works can replace weeks or even months of pencil–and–paper work. *Computers* are thus used because *<u>they</u> (4) are efficient* and because *the time saved offsets <u>their</u> (5) cost*. <u>These</u> (6) are two of the many reasons why <u>they</u> (7) are used so much in industry, business and research.

Underlined word		Referent (word of phrase referred to)
1	it	a computer
2	it	a computer
3	it	more information
4	they	computers
5	their	computers
6	these	they are efficient; and because the time saved offsets their cost
7	they	computers

- **Read through the paragraphs on the following pages.**
- **Identify the words/phrases/sentences to which the underlined words refer.**
- **Complete the table** provided on p. 33 (as in the example above) giving the underlined word in the left column, and in the right column the words/phrases/sentences to which the underlined word refers. Note that the word(s) referred to can be a single word, a phrase, a sentence (or even more than one sentence, although we do not have such an example here). It is important to write down all the words/phrases etc. which are begin referred to.
- **Cut out the table and include it in your assignment.**

1. Suppose that you have a square sheet of paper that measures 10 cm by 10 cm. Then the area is 10 cm $\times$10 cm, i.e. 100 cm^2. We say that the area is 100 square centimetres. How many square metres do you think this (1) is? Note that the unit for area is derived from the product of the two length units. Since they (2) are both cm, the unit for area is represented by cm $\times$ cm which we can write as cm^2.

2. We have postulated that every real number can be represented by a point on a line, and conversely, that each point on the line can be associated with a unique real number. Numbers can be assigned places on the line by comparing them (3) with one another in terms of their size and in terms of their position to the left or right of zero. In Book 1 we introduced the idea of using letters of the alphabet to represent numbers. We call these (4) variables (they (5) represent quantities that may take on different, or various, values.)

3. It is not enough to memorise a mathematical method and apply it (6) blindly. In any case, there will eventually be a problem with "memory space" if you try to memorise every method you come across. If we try to store too much on a computer file we see a message "insufficient memory space" on the screen, and we have to upgrade the computer's memory, or make another arrangement. It would be useful if we could upgrade our own memory, but since we cannot do so (7), we should not abuse it (8) by trying to memorise unnecessary facts.

4. We have said that we can add, subtract, multiply and divide real numbers by applying the same sign rules that apply to integers. However, when we extend our arithmetic operations to $\mathbb{R}$ we need to introduce a few more manipulative procedures. We first need to understand them (9); later on they (10) can become rules that we apply automatically.

5. The word "percent" comes from the Latin phrase "per centum" which means "out of one hundred". So a mark given out of a total of 100, for example 20 out of 100, will be a mark of 20 percent. Our mathematical notation for this (11) is 20%. Even if the mark was not originally out of a total of 100, we can use the concept of equivalent fractions to express it (12) as a percentage.

6. Suppose Sarah has a mark of $\frac{66}{90}$ for her English test, while Simon scores $\frac{55}{65}$ for his English test. How does the teacher know which of these pupils (13) has done better? One cannot use direct comparison since each test has a different total. The easiest way to compare these results (14) is by changing each mark to a percentage.

7. In Definition 4.1.1, we defined only positive integral exponents. We now want to define the zero exponent and negative integral exponents in such a way that they (15) also obey the rules that positive exponents do.

8. You were asked to work out how many cubic metres of sand you needed for your building project. We say that units of length (e.g. metres) combine to give units of area (e.g. square metres) and units of volume (e.g. cubic metres). These (16) are known as derived units. There are many commonly used derived units.

9. A speed trap recorded that a motorist travelled 1 m (i.e. the distance between the two lines of the speed trap) in 0, 025 of a second. Did he exceed the 120 km/h speed limit? Hint: Find the motorist's speed in m/s and then convert it (17) to km/h.

Word number	**Underlined word(s)**	**Word/phrase/sentence to which underlined word refers**
1.	this	
2.	they	
3.	them	
4.	these	
5.	they	
6.	it	
7.	so	
8.	it	
9.	them	
10.	they	
11.	this	
12.	it	
13.	these pupils	
14.	these results	
15.	they	
16.	these	
17.	it	

Section 2

FIRST READ THE SECTION IN THE BOX BELOW.

Instructions

- In each of the sentences below, one word has been left out. **Select the word which you think best fits the sentence from the four choices provided.**

Pre–primary education aims to develop the young child to a state for readiness for ____________ schooling.

(a) firm
(b) fierce
X (c) formal
(d) frequent

Many children come from ____________ slums on the periphery of large cities, which, with their overcrowded living conditions, offer a limited range of stimulation to the child.

X (a) squalid
(b) affluent
(c) appropriate
(d) prestigious

- **Cut out the pages and include them in your assignment.**

PLEASE DO NOT CONSULT A DICTIONARY OR ANY OTHER BOOK, OR ASK SOMEONE ELSE FOR HELP. REMEMBER THAT THIS SECTION AIMS TO DIAGNOSE WHAT YOU KNOW NOW. WHEN YOU STUDY YOU WILL OBVIOUSLY USE A DICTIONARY, OR REFER TO YOUR STUDY GUIDES, BUT FOR NOW ANSWER THE QUESTIONS WITHOUT REFERRING TO OTHER SOURCES.

1. Without giving any formal definitions you will be able to see that we may call two sets equal if they contain ______________ the same elements.

   (a) precisely (b) principally
   (c) possibly (d) partially

2. When terms consist of a ______________ of both variables and constants, we can describe each separate component of the terms in various ways.

   (a) collection (b) confusion
   (c) comparison (d) combination

3. If the converse of a statement is true we know that the converse must be valid in every possible case, with no ______________.

   (a) exceptions (b) experiences
   (c) expressions (d) explanations

4. Understanding something that is being explained to you requires conscious effort, since it is easy to listen and ______________ not think.

   (a) still (b) even
   (c) besides (d) instead

5. The logical skills acquired through the study of mathematics ______________ the development of the ability to question, and to argue rationally and logically.

   (a) frustrates (b) fluctuates
   (c) facilitates (d) implicates

6. We use directed numbers, i.e. positive and negative numbers, to ______________ between temperatures that are above or below 0 °C.

   (a) evaluate (b) estimate
   (c) deviate (d) differentiate

7. In certain cases zeros may be ______________ , but in most cases they are retained.

   (a) inserted (b) obtained
   (c) omitted (d) included

8. Often letters at the beginning of the alphabet, e.g. a, b, c, are used for constants, and letters a the end of the alphabet such as x, y, z, are used for variables. When we substitute numbers for th variables we say that we ______________ values to the variables.

(a) attain
(b) affect
(c) assign
(d) assume

9. Most people have an ______________ sense of how to combine natural numbers, since adding tw natural numbers results in a natural number, while subtracting one natural number from anothe does not necessarily result in a natural number.

(a) intact
(b) inverse
(c) integral
(d) intuitive

10. The ability to plan carefully and to take responsibility for all arrangements is one of the ______________ of a successful journey.

(a) precedents
(b) prepositions
(c) prerequisites
(d) preconceptions

11. If a water tank is ______________ full, and more water is pumped into the tank, it will overflow.

(a) correspondingly
(b) conveniently
(c) comprehensively
(d) completely

12. In mathematics it is important to pay ______________ attention to the way in which solutions o equations are presented.

(a) practical
(b) partial
(c) particular
(d) provisional

Section 3

FIRST READ THE SECTION IN THE BOX BELOW

Instructions
• **Read the following passages** (numbered I, II and III) and then **answer the questions** that follow.   • **Cut out the pages on which the questions are answered and include them in your assignment.**

I Mathematics is all about problem solving. However, we are not always sure how best to tackle the problems. When we first read a problem, it can often seem too difficult to solve. Also, we may have no idea where to start. One way of getting into a problem is to imagine a simpler version. Solving the simpler version may give you a clue to how to solve the full problem.

The direct approach is not always appropriate for solving certain problems. Sometimes the problem that is in front of you is best solved indirectly. It may help if you first identify and solve a related problem. Once you have done this, you can then find the solution to the original problem.

You may also find yourself in a situation where you have a rough idea of how to do something, or where you are not sure which of the two methods is correct. In such cases you can often work it out by testing each method on an extreme case.

Sometimes when you are stuck with a problem it helps to look at a special case. The special case may be easier to solve, and in solving it you may get a clue about the general case.

Now answer the questions based on I.

II We have seen that "subtracting a positive number" is the same as "adding a negative number", e.g. $7-3 = 7+(-3) = 4$; and "subtracting a negative number" is the same as "adding a positive number", e.g. $7-(-3) = 7+3 = 10$.

We think of subtraction as the "opposite" or "inverse" of addition. ....(i).......... we think of division as the "inverse" of multiplication, and we can define the division of two numbers in terms of multiplication.

If a and b are integers then $a \div b$ will be an *integer* if we can find an integer c such that $c \times b = a$. For example

$$6 \div 2 = 3, \quad \text{because } 3 \times 2 = 6.$$

.......(ii)......... division of two integers will not always result in an integer. If we consider the rational numbers then we can define $a \div b$ for all $a, b \in \mathbb{Z}$ where $b \neq 0$. The quotient may not be an integer, ...(iii)........ it will be a rational number. In this case we have

$$a \div b = \frac{a}{b} = a \times \frac{1}{b}.$$

We consider this in more detail later when we work with fractions. However, you can see that

$$14 \div 2 = \frac{14}{2} = 14 \times \frac{1}{2} = 7.$$

This is easy to understand if we relate it to a real–life situation: if there are 14 books, to be shared between 2 people, then two people each get $\frac{1}{2}$ of the total number of books, i.e. 7 books.

What happens when we multiply or divide integers? Small children do not know that they are multiplying when they work out how many sweets there are altogether if each child has a certain number. For example, ...(iv).......... 4 children each have 6 sweets. We can work out the total number of sweets by calculating $6 + 6 + 6 + 6$, i.e. there are 24 sweets altogether. Examples such as this show that we can think of multiplication as *repeated addition* (i.e. adding the same number a given number of times). Of course the everyday examples children encounter involve only natural numbers, but the principle also holds when we work with integers.

Now answer the questions based on II.

III There are several stages that occur in a typical solution to a mathematical problem. The initial fuzzy problem may not immediately look mathematical. It is even less likely to be clear which type of mathematical problem it represents. The first step in a solution is to recognise the type of problem, e.g. finding an area or solving equations.

The second step involves recalling the appropriate method or rule that needs to be applied, e.g. "*I can see this is about simultaneous equations so I need a method for solving them*".

In the third step you apply the method. This means taking the data out of the problem and putting it into mathematical form.

In the fourth step, you manipulate the data. This step eventually leads to an answer.

Now answer the questions based on III.

For I:

1. Put a cross (X) next to the option below that you think would be a suitable heading for this passage.
   (a) Simple solutions to mathematical problems
   (b) Problem solving techniques
   (c) Using related problems to solve mathematical problems
   (d) How to read mathematical problems

2. Look at the example below. This example illustrates a solution to the kind of problem solving method suggested in passage I, in
   (a) the first paragraph.
   (b) the second paragraph.
   (c) the third paragraph.
   (d) the fourth paragraph.

In Figure 1 there is a triangle. It is hard to tell from looking at this how many degrees there are in its angles.

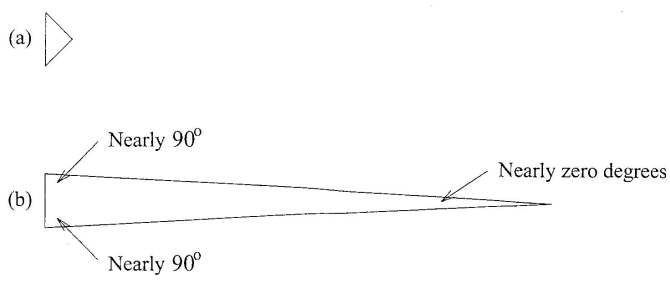


Figure 1: An example of an extreme triangle

Imagine that you take hold of the triangle's right–hand point and pull it to the right. The triangle will get longer and longer. The two angles on the left–hand side get larger; the one on the right gets smaller. I cannot show it pulled very far on this page but you can imagine that if I keep on pulling to the right, the two angles on the left will each get nearer and nearer to 90^o and the one on the right will get nearer and nearer to zero.

From looking at this extreme case of a very long thin triangle, we can see that the angles in a triangle must add up to 2×90^o, i.e. to 180^o.

1. Without giving any formal definitions you will be able to see that we may call two sets equal if they contain ______________ the same elements.

   (a) precisely
   (b) principally
   (c) possibly
   (d) partially

2. When terms consist of a ______________ of both variables and constants, we can describe each separate component of the terms in various ways.

   (a) collection
   (b) confusion
   (c) comparison
   (d) combination

3. If the converse of a statement is true we know that the converse must be valid in every possible case, with no ______________.

   (a) exceptions
   (b) experiences
   (c) expressions
   (d) explanations

4. Understanding something that is being explained to you requires conscious effort, since it is easy to listen and ______________ not think.

   (a) still
   (b) even
   (c) besides
   (d) instead

5. The logical skills acquired through the study of mathematics ______________ the development of the ability to question, and to argue rationally and logically.

   (a) frustrates
   (b) fluctuates
   (c) facilitates
   (d) implicates

6. We use directed numbers, i.e. positive and negative numbers, to ______________ between temperatures that are above or below $0\,^{\circ}$C.

   (a) evaluate
   (b) estimate
   (c) deviate
   (d) differentiate

7. In certain cases zeros may be ______________ , but in most cases they are retained.

   (a) inserted
   (b) obtained
   (c) omitted
   (d) included

8. Often letters at the beginning of the alphabet, e.g. a, b, c, are used for constants, and letters a the end of the alphabet such as x, y, z, are used for variables. When we substitute numbers for th variables we say that we ______________ values to the variables.

(a) attain
(b) affect
(c) assign
(d) assume

9. Most people have an ______________ sense of how to combine natural numbers, since adding tw natural numbers results in a natural number, while subtracting one natural number from anothe does not necessarily result in a natural number.

(a) intact
(b) inverse
(c) integral
(d) intuitive

10. The ability to plan carefully and to take responsibility for all arrangements is one of the ___________ of a successful journey.

(a) precedents
(b) prepositions
(c) prerequisites
(d) preconceptions

11. If a water tank is ______________ full, and more water is pumped into the tank, it will overflow.

(a) correspondingly
(b) conveniently
(c) comprehensively
(d) completely

12. In mathematics it is important to pay ______________ attention to the way in which solutions o equations are presented.

(a) practical
(b) partial
(c) particular
(d) provisional