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|  | **Campbell House School Teaching and Learning Program** | | | | | | | | | | | | | | | | |
| **Title/Type of Unit: Maths yr 11/12 – Mathematics and driving / Maths and communication**  **FSDr1,2,3 Driving Safely**  **FSCo1,2 Owning a mobile phone**  **Duration: 10 weeks** | | | | | | | | | | | | | | | | |
| **Syllabus Outcomes**  **Stage 6** | *A student:*  MGP-1 Uses mathematics and statistics to compare alternative solutions to contextual problems  MGP-2 represents information in symbolic, graphical and tabular form  MGP-6 models financial situations relevant to the student’s current life using appropriate tools  MGP- 9 uses appropriate technology to organise information from a limited range of practical and everyday contexts | | | | | | | | | | | | | | | | |
| **Connectedness**  **Why does this learning matter?** | **Students learn to:**   * - calculate the registration, stamp duty and insurance costs for new and used motor vehicles  - calculate the cost to finance the purchase of a motor vehicle - solve problems related to the fuel consumption of a motor vehicle - calculate the depreciation of the value of a motor vehicle using the straight-line method and the declining- balance method - calculate the total running cost, including the standing costs and operating costs, of a motor vehicle  - solve problems related to speed, distance and time  - calculate the distance a motor vehicle travels in the time it takes to bring it to a stop - interpret tables and graphs related to motor vehicle accidents and mobile phone plans. - read, interpret and analyse mobile phone bills and plans   - describe and convert units of storage | | | | | | | | **Students learn about:**  - interpreting tables and graphs to calculate motor vehicle purchase price and insurance costs - calculating the cost of finance   - calculating fuel consumption   - calculating depreciation   - calculating the running costs of motor vehicles   - calculating speed and distance travelled   - solving problems relating to the safe operation of motor vehicles, including determining blood alcohol content and car stopping distances   - interpreting tables and graphs of road accident statistics.   - reading, interpreting and analysing mobile phone bills and plans - calculating the cost of calls, sending and receiving messages and data - constructing and interpreting tables and graphs of mobile plans - calculating upload and download times | | | | | | | | |
| **Background and Key Ideas** | This unit deals with the interpretation and comparison of mobile phone plans and usage, and the calculation of related costs.  The knowledge and skills to practical driving contexts involving the purchase, running costs and safety of motor vehicles. | | | | | | | | | | | | | | | | |
| **Literacy Continuum** | Reading Texts | Comprehension | | | Vocabulary Knowledge | | Aspects of Writing | | | Aspects of Speaking | | | Phonics | Phonemic Awareness | | | Concepts About Print |
| **Literacy Aspect: Literacy is not the main focus in this program however key words and terminology will be addressed.**  **Teaching activities linked to program to increase learning:**   * **KEY WORDS**   bits byte cap pre paid plan  allowance usage data gigabyte  megabyte (MB) terabyte (TB) kilobyte (KB) upload  depreciation consumption registration insurance | | | | | | | | | | | | | | | | |
| **Numeracy Continuum** | Counting Sequences | | Counting as Problem Solving | | | Pattern and Number Structure | | Place Value | | | | Multiplication and Division | | | Fraction Units | | Length, Area and Volume |
| **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 4 Repeated abstract composite units**  **Teaching activities linked to program to increase learning:**  Coordinates two composite units as an operation, e.g : Students to use known facts to solve the problem. The student then writes all inverse operations for that number sentence. **E.g** 6x3 3x6 18÷6 18÷3 W/sheets and games with a focus on all timetables. E.g Multo  Uses multiplication and division as inverse operations flexibly in problem solving tasks.  **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 4 Repeated abstract composite units**  **Teaching activities linked to program to increase learning:**  Coordinates two composite units as an operation, e.g : Students to use known facts to solve the problem. The student then writes all inverse operations for that number sentence. **E.g** 6x3 3x6 18÷6 18÷3 W/sheets and games with a focus on all timetables. E.g Multo and 21  Uses multiplication and division as inverse operations flexibly in problem solving tasks.  **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 5 Multiplication and Division as operations**  **Teaching activities linked to program to increase learning:**   * Being able to extend knowledge of number facts to derive other relationships.   e.g. 20 x 8 to 20 x 80 to 20 x 800  12 x 3 = 10 x 3 + 2 x 3  **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 4 Repeated abstract composite units**  **Teaching activities linked to program to increase learning:**  Coordinates two composite units as an operation, e.g : Students to use known facts to solve the problem. The student then writes all inverse operations for that number sentence. **E.g** 6x3 3x6 18÷6 18÷3 W/sheets and games with a focus on all timetables. E.g Multo  Uses multiplication and division as inverse operations flexibly in problem solving tasks.  **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 5 Multiplication and Division as operations**  **Teaching activities linked to program to increase learning:**   * Being able to extend knowledge of number facts to derive other relationships.   e.g. 20 x 8 to 20 x 80 to 20 x 800  12 x 3 = 10 x 3 + 2 x 3  **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 4 Repeated abstract composite units**  **Teaching activities linked to program to increase learning:**  Coordinates two composite units as an operation, e.g : Students to use known facts to solve the problem. The student then writes all inverse operations for that number sentence. **E.g** 6x3 3x6 18÷6 18÷3 W/sheets and games with a focus on all timetables. E.g Multo  Uses multiplication and division as inverse operations flexibly in problem solving tasks.  **Student:**  **Numeracy Aspect: Multiplication and Division**  **Element: 5 Multiplication and Division as operations**  **Teaching activities linked to program to increase learning:**   * Being able to extend knowledge of number facts to derive other relationships.   e.g. 20 x 8 to 20 x 80 to 20 x 800  12 x 3 = 10 x 3 + 2 x 3 | | | | | | | | | | | | | | | | |
| **Quality Teaching** | | | | | | | | | | | | | | | | | |
| **Intellectual Quality** | | | | **Quality Learning Environment** | | | | | | | **Significance** | | | | | | |
| * IQ1 Deep Knowledge * IQ2 Deep Understanding * IQ3 Problematic Knowledge * IQ4 Higher-order Thinking * IQ5 Metalanguage * IQ6 Substantive Communication | | | | * QLE1 Explicit Quality Criteria * QE2 Engagement * QE3 High Expectations * QE4 Social Support * QE5 Students’ Self-regulation * QE6 Student Direction | | | | | | | * S1 Background Knowledge * S2 Cultural Knowledge * S3 Knowledge Integration * S4 Inclusively * S5 Connectedness * S6 Narrative | | | | | | |
| **Teaching and Learning Lesson Overview** | | | | | | | | | | | | | | | | | |
| **The Elements of Learning & Achievement**    F:\Mock ups\Square elements\Numeracy.jpg        E:\Final V1\Final sq NO border\Sq Technology no bdr.jpg | **Week 1** Cost of purchase  There are a number of costs additional to the retail price when purchasing a new car. Registration, stamp duty and compulsory third-party insurance are compulsory costs. There may also be a dealer delivery charge, other insurance costs and, if borrowing money to purchase the car, interest charges on the loan. (p 430- 434 Insight Mathematics General) Financing a purchase / fuel consumption Often people need to borrow money to buy a car. There are many financial institutions that will provide a car loan or personal loan for this purpose.  **Simple Interest**  P = initial quantity  r = percentage interest rate per period expressed as a decimal  n = number of periods  (p 435 – 439)  **Week 2** Depreciation  The **depreciation** of an item is its loss in value due to age and usage. The value of an item after depreciation is called its **salvage value**, or **book value**, or **written-down value**.  The formula for the straight-line method is *S* = *V*0 − *Dn* where *S* = salvage (current) value of the asset *V*0 = purchase price of the asset *D* = amount of depreciation per time period *n* = total number of time periods.  A formula that can be used for the declining-balance method is *S* = *V*0(1 − *r*)*n* where *S* = salvage (current) value of asset  *V*0 = the purchase price of asset *r* = the percentage interest rate per time period, expressed as a decimal *n* = the number of time periods. (p 440 – 446)  **Week 3** Running Costs  The total running cost of a vehicle is made up of **standing costs** (fixed) and **operating costs**.  Standing costs include the depreciation in value of the vehicle (the loss in value due to age and use), the interest charged on the loan used to purchase it, and on-road costs such as registration, CTP insurance and membership of a motoring organisation that provides roadside assistance (for example NRMA).  Operating costs are running costs that depend on how the vehicle is driven, such as the cost of fuel, tyres, servicing and repairs. (p 447-448)  **Week 4** Blood alcohol content (BAC)  Blood alcohol content is a measure of the concentration of alcohol in a person’s blood. It is expressed as a 0.02  percentage mass per unit of volume. For example, a person with a BAC of 0.02 (%) has \_\_\_\_ g of alcohol in every millilitre of their blood. This is equivalent to 0.02 g/100 mL or 20 mg/100 mL.  *N* = 0.789 × *V* × *A* where  *N* = number of standard drinks *V* = the volume of the container in litres  *A* = percentage of alcohol (% alc/vol) in the drink. (This is stated on the container.) (p 449-453)  **Week 5** Speed, distance and time / braking distances  Average speed= distance travelled / time taken  This is usually written *S* = *D*/*T* where *S* is the average speed, *D* is the distance travelled and *T* is the time taken so it follows that D=S X T and T = D/SThis formula is used to calculate the average speed, distance and time travelled.  The braking distance is a function of the square of the speed of the car. For a car with good brakes and tyres, travelling in dry conditions on a good road, the relationship can be approximated by the formula *d* = 0.01*v*2, where *d* is the braking distance in metres and *v* is the speed of the car in km/h.  For the same car travelling on a slippery road, the formula for braking distance becomes *d* = 0.014*v*2 (p 453-457)  **Week 6** Mobile phone bills  There are many different phone plans, service providers and consequently types of phone accounts. This section will examine one type of phone account, but it is advised that students bring their own accounts to analyse and compare details. (p472-475)  **Mobile phone costs**  Different mobile plans have different ways of calculating call costs as well as different rates and connection fees. Rates are usually quoted per 30 seconds or per minute. Text messages are usually charged at a fixed rate per text up to a certain number of characters. There are different types of plans available: A prepaid plan involves paying an amount up front and then using that credit to make calls.   A post-paid plan is the opposite and you are charged for the usage in the previous month.   A cap plan has a certain number of calls included in the fixed up-front payment.   (p 475-478)  **Week 7** Mobile phone plans  There are many mobile phone plans available. This section will examine a few. Plan details, call costs  **Mobile phone charges**  As many mobile call rates are billed by the minute or in 30-second intervals, the graphs of call cost are piecewise linear graphs or step graphs. This section uses tables and graphs to represent the costs of mobile phone usage. (p 479 – 485)  **Mobile phone usage**  Some mobile plans have times when call rates vary. For example, some plans have peak and o peak rates, while others have periods of free time. Analysing phone and data usage will show which plan is the most cost effective. (p486-490)  **Week 9** Scientific notation review  Scientific (or standard) notation is a convenient way of writing very large and very small numbers. A number is expressed in scientific notation by writing it as a product of a number between 1 and 10 and a power of 10. A number written in scientific notation has a positive power for large numbers and a negative power for small numbers. (491-493)  **Memory and file size**  Digital data is described in terms of bits and bytes where 1 byte is equal to 8 bits. The prefixes from the SI data list are used to describe size, for example kilo (k), mega (M), giga (G), etc. but they are not powers of 10 as the SI units dictate. There is another system that uses kibi, mebi, gibi, etc. and Investigation **14.3** examines the di erences. In this course it is assumed that kilobyte (KB for data storage) and kibibyte mean the same amount.  **Week 10 Revision / Assessment** | | | | | | | | | | | | | | | **The Australian General Capabilities**  Aboriginal and Torres Strait Islander histories and cultures boriginal and Torres Strait Islander histories and cultures  Asia and Australia's engagement with Asia sia and Australia's engagement with AsiaSustainability ustainability  Critical and creative thinking ritical and creative thinking  Ethical understanding thical understanding  Information and communication technology capability nformation and communication technology capability  Intercultural understanding ntercultural understanding  Literacy iteracy  Numeracy umeracy  Personal and social capability ersonal and socail capability  Civics and citizenship ivics and citizenship  Difference and diversity ifference and diversity  Work and enterprise ork and enterprise | |
| **Special Needs Adjustments** | | | | | | | **School to Work** | | | | | | | | | | |
| One on one assistance to complete literacy components of tasks if required  Someone to read and sometimes srcibe work.  Students will participate in lessons that are highly scaffolded.  Students will view examples before given tasks to work on individually, in small groups or individually with teacher/SLSO assistance.  Students will be given simple one step instructions both verbally and written on the board.  Opportunity will then be given to complete short modified questions independently.  Use a range of software, including word processing, to create, edit and publish texts imaginatively.  Break lessons into small sections at a time if required. | | | | | | | Every year hundreds of people are killed on Australian roads and many more are affected by road incidents.  Australians are among the highest users of mobile phones in the world. Almost everyone has one.  Some examples are owning a car or mobile phone. Calculating travelling times and checking blood alcohol content before driving. When you want to check your mobile phone bill. | | | | | | | | | | |
| **Assessments. Type. Weight 30%. Due Date** | | | | | | | | | | | | | | | | | |
| Assessment type: Response  Conditions: Time for the task: 40 minutes In class, calculator permitted  Marks: 7 marks  Task weighting: 10% of the school mark for this pair of units  **Assessment test in week 9**  **Assessment - 20% topic test on focus study of communications**  **Assessment consists multiple choice and short answer questions** | | | | | | | | | | | | | | | | | |
| **Resource List** | | | | | | | | | | | | | | | | | |
| **Yr11 Mathematics General text book (New Century Maths)**  Insight Mathematics General)  **Oxford digital worksheets**  **Calculators**  **Formulae sheet** | | | | | | | | | | | | | | | | | |

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| **Teacher Evaluation**  **Comments / Variations** | |
| Guiding Questions  What worked well?  What needed to be changed?  What do I think the students gained from this lesson?  How well did this unit match the Elements of Learning and Achievement?  What did I learn?  How will I use this experience to extend my practice in the future? | |
| **Date Commenced**: | **Date Finished**: |
| **Teachers Signature**: | **Assistant Principals Signature**: |