Project title: Numbers Count Everywhere

Project description: Years 7–8 Students (in groups of 2) meet with members of the community to discuss numeracy issues that have relevance in their individual workplaces (where possible or do Internet research). Students in consultation with these mentors develop a practical challenge involving a cross-section of careers, e.g. police officer, fireman, nurse, builder, ambulance officer, shopkeeper, postman, chef, architect, engineer, politician, real estate agent, architect, musician, etc. will ensure a wide range of numerical challenges.

Students will work with both their adult mentors and teachers to develop workable practical challenge, other groups the opportunity to modify any problems.

After students have developed their they will pose their challenges to within the classes. This gives groups the opportunity to modify any problems.

Other schools in the area will be invited to take part in the ‘Numbers Count Everywhere’ workplace expo. During the expo, the students who developed the scenarios (now the experts and guides) will take a leadership role to aid visiting students work through the numeracy challenges faced in each different career.

Person responsible for project: Karen Smith

School, region, diocese: Tweed Valley College

Contact person’s email: ksmith@tvc.nsw.edu.au

Number of students, teachers, parents, other community members directly involved:
• 58

Intended literacy and/or numeracy outcomes:
• the use of hand-on materials supports the understanding and development of numeracy concepts for both the original students and the students from other schools in the area
• increased relevance can increase student motivation
• small group work encourages discussion and exploration of ideas, collaborative and independent learning
• discussions enable students to engage with and understand new and established mathematical concepts with the reinforcement of working with mentors in real life situations
• students value the mathematics used in the workplace and
develop a confidence and competence in using number in a problem solving context
• opportunities for collaboration.

Evidence of achievement of intended literacy and/or numeracy outcomes:
• students involved were very enthusiastic and reluctant to swap sessions each rotation
• teachers involved observed students working mathematically discussing further applications
• students were able to confidently complete worksheets.

Feedback about making grants available for such projects:
Have really enjoyed the challenge of helping students get switched on to numeracy. Wonderful to see funding being available to help students make connections and increase student achievement and interest.

Teaching materials:

Tiler

Task: Your task is to calculate how much it will cost for this room to be tiled completely. You need to include the cost of:
• complete tiles required
• glue for each tile
• grout (seals joins between the tiles).

Information:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tile</td>
<td>$2 per tile</td>
</tr>
<tr>
<td>Glue</td>
<td>10c per tile</td>
</tr>
<tr>
<td>Grout</td>
<td>2c per join</td>
</tr>
</tbody>
</table>

Calculations:
Number of Tiles Needed:

Number of Joins between Tiles:

Cost Calculation:
Number of Tiles x Cost per Tile =
Number of Tiles x Glue Cost =
Number of Joins x Grout Cost =
Total Cost =

To give the home owner the cost of tiling this room, you add a 50% profit margin. How much would you charge the home owner?

________________

__
Task:
You have been asked to help design a children’s golf course by answering the following questions from the golf course designers.

Information Required:
Measurement of distance the golf ball hit:

____________________
[This number will be used as the average hitting distance below]

Questions:
1. The golf course designers are working out what ‘par’ (or how many strokes should be needed) for each golf hole. They use the following formula:

   \[ \text{Par} = 2 + \left( \frac{1}{2} \right) \text{average hitting distance or part thereof} \]

   What is par for the following lengths?
   - 50 metres: ______________________
   - 100 metres: ______________________
   - 180 metres: ______________________
   - 250 metres: ______________________

2. The final question the golf course designers have is regarding how long it would take a group to play 9 holes. They know the following information:
   a. The course is 3 kilometers long and people walk at 1 kilometer every 15 minutes
   b. There are 9 holes and par for the whole course is 36
   c. It takes about 30 seconds minute for each stroke.

   Using this information, explain how long you expect a group of 4 to take. Write down all your working.
**Road Builder**

**Task:**
Your task is to calculate the steepest angle that is safe for car drivers. A model has been created and you need to use the information given to answer the following questions.

**Information:**
Using the car provided if it travels further than 2 metres then the ramp is too steep.

**Activities:**
1. Changing the angle on the ramp, discover the highest angle which is still safe.

   ________________

2. Using your answer in question 1 – use the following formula to work out how much horizontal distance (h) needs to be covered to safely fall the following vertical given amounts. (v)

   Formula: \( h = \frac{v}{\tan \text{ (safe angle)}} \)
   a. \( V = 50 \) metres

   ________________

   b. \( V = 350 \) metres

   ________________

3. A mining train can only climb at a safe angle of 7° due to the weight limitations. If a train has to climb 800 metres vertically how far will it have to travel horizontally?

   ________________
Aerospace Engineer

**Task:**
Your task is to calculate the lowest number of beams required to hold a certain amount of weight. Since you are designing an aeroplane you don't want extra weight but it needs to be strong enough to do the job.

**Information:**
You will be given two different weights. Tie the weight to the middle of the pasta and see if it will hold the weight. If so, remove some pasta until you get as close as you can for both of the weights.

**Results:**
Weight 1:
____________________

Weight 2:
____________________

**Challenge Activities:**
Weight 1 is demonstrating the strength required in the wings. If one strip of pasta represents 1 beam weighing 3 kg, how much weight is required in framing in the wings?

____________________

Weight 2 represents the strength required in the body of the plane. If one strip of pasta here represents 8kg, how much weight is required in framing for the body?

____________________

What would be the cost of all this framing if a wing beam costs $15 000 and a body beam costs $23 000?

____________________
Task:
Your task is to follow the instructions below and walk out the following course. The area in between the 5 points is going to be used to build a house. You are to make note of any obstructions that will need to be removed/avoided if the plan is followed through.

Instructions:
Using the starting 0° direction given, walk 30 metres.
Turn 90° to your left and walk 15 metres
Turn 90° to your left and walk 20 metres
Turn 45° to your left and walk to where you started.

Questions:
1. Draw a diagram showing the path you undertook. Label the lengths on each side.

2. You have been requested to work out the area the house will cover. Split the diagram into two shapes and calculate the area required.

3. The final task required is to work out the bearing/heading to your next activity. Have 0 point to the closest corner of the school.

Numbers Count Everywhere

Student Instruction Sheet
In groups of 2 or 3 your task is to design a hands-on challenge activity that demonstrates how numeracy is relevant to individual workplaces. This activity will be
done by other students in the school and should be practical, interesting and able to be completed in 10 minutes.

Your group has a budget of around $90 that can be spent on equipment you need to make your activity engaging.

On the back of this sheet are some suggested careers that have some ideas for an activity.

By the end of this class you need to decide on:

• your career
• brief explanation of activity
• equipment needed
• reason for activity.

More classes will be given to finalise the concepts.
1. A normal ride goes around four times. How long does the ride go for? How did you count the number of revolutions?

2. Each seat takes 2 adults or 1 adult and 2 children (under 10) What is the maximum number of people that the ride can hold?

3. If the ride takes 5 minutes to change passengers what is the maximum amount of people that can ride per hour.

4. If the ride costs $120 per hour to run. How much would you suggest as a price for the ride (both adult and children) – Show all calculations and explain your logic.

5. If the Ferris Wheel and the Carousel cost the same amount to purchase and the same amount to run, and the rides also take the same amount of time to load. Which would you purchase and why?

6. What about a roller coaster that gives a quicker ride, but takes only half the amount of passengers and takes twice as long to set up at each place.
Parcel postage
Welcome to your first day running the Murwillumbah post office. Christmas is approaching and you have been asked to run the Parcels counter.
You have weigh the parcels, calculate the postage, work out the stamps that are required. You have been left with the following stamps (5¢, 10¢, 50¢, 75¢, $1, $2, $5, $10). Finally, take customers’ money and give correct change.
You have 5 customers, remember to smile and make polite conversation.

<table>
<thead>
<tr>
<th>Parcel A</th>
<th>Weight:</th>
<th>Cost:</th>
<th>Stamps used:</th>
<th>Money given:</th>
<th>Change:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Parcel B</th>
<th>Weight:</th>
<th>Cost:</th>
<th>Stamps used:</th>
<th>Money given:</th>
<th>Change:</th>
</tr>
</thead>
<tbody>
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</table>

<table>
<thead>
<tr>
<th>Parcel C</th>
<th>Weight:</th>
<th>Cost:</th>
<th>Stamps used:</th>
<th>Money given:</th>
<th>Change:</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
If you finish early calculate the total postage and the number of each stamp you have sold.
**Parcels**

**Small Parcels**

The charge for small parcels up to 500g does not depend on distance.

<table>
<thead>
<tr>
<th>Weight</th>
<th>Charge per Regular Parcel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 250g</td>
<td>$4.20</td>
</tr>
<tr>
<td>Over 250g up to 500g</td>
<td>$5.40</td>
</tr>
</tbody>
</table>

**Regular Parcels over 500g up to 20kg.**

Basic Charges:
- $7.20 for destinations in the same state.
- $9.15 for interstate destinations (62.5% for Norfolk Island).

**PLUS**

Distance charge per kg or part thereof, calculated from the table below.

<table>
<thead>
<tr>
<th>Location Zone</th>
<th>Destination Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P1</td>
</tr>
<tr>
<td>S</td>
<td>1.00</td>
</tr>
<tr>
<td>N1</td>
<td>0.90</td>
</tr>
<tr>
<td>N2</td>
<td>0.80</td>
</tr>
<tr>
<td>V1</td>
<td>0.70</td>
</tr>
<tr>
<td>V2</td>
<td>0.60</td>
</tr>
<tr>
<td>W1</td>
<td>0.50</td>
</tr>
<tr>
<td>W2</td>
<td>0.40</td>
</tr>
<tr>
<td>W3</td>
<td>0.30</td>
</tr>
</tbody>
</table>

**Parcel Zones for Distance Charge**

1. Use the table to the right to find the lodgment and destination zone codes.
2. Use the zone codes in the tables above to calculate the distance charge per kilogram.
3. Add the total distance charge to the appropriate basic charge.

**Parcels over 20kg**

The charge is calculated using actual weight if this is greater than the basic weight. The basic weight is:
- 500g (509) for New South Wales, Northern Territory, and South Australia.
- 1000g (1009) for Victoria.
- 500g (509) for Queensland and Western Australia.

**Note:** Parcels over 20kg are charged at the same rate as small parcels.
Example: A Regular Parcel, weight 5.1 kg, is in postcode 2598 (zone N7) for delivery to postcode 0806 (zone T3). Base charge: $8.65 Distance charge: $2.95 per kg or part thereof = $2.95 x 6 = $17.70 Total charge: $8.65 + $17.70 = $26.75

<table>
<thead>
<tr>
<th>Zone</th>
<th>Q1</th>
<th>Q1</th>
<th>S1</th>
<th>S2</th>
<th>NT1</th>
<th>W1</th>
<th>W2</th>
<th>WS</th>
<th>T1</th>
<th>NF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.20</td>
<td>1.10</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.45</td>
<td>1.45</td>
<td>1.45</td>
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<tr>
<td>0.10</td>
<td>0.10</td>
<td>1.15</td>
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</table>

As the parcels volume is cubic meter indicated on 250. For further details see Coding Page 14.
When you get a new client, you must perform checks on them to determine their level of fitness so you can individualize a program for them.

1. First, check your heart rate to see if it is in a healthy range. A normal, healthy resting heart rate is usually around 60 beats a minute. Find your pulse on your wrist or neck.

   *Beats in 15 seconds _________*  
   *Heart rate = Beats x 4 =*

2. **Determine your maximum heart rate**
   
   a) The easiest formula is simply to subtract your age from 220.
   
   Maximum heart rate = 220 - _____ =
   
   b) Another method is to find your maximum heart rate is to use 207 – 0.7 multiplied by your age.
   
   Maximum heart rate = 207 – 0.7 x ____ =

3. **Training Zones** (Clients can be all fitness levels so you need to complete the following)

**UNFIT**

Exercise between **50 - 60 percent** of your maximum heart rate.

If you are in this category your rate should be between

50% of Max = _______________ 60% of Max = ____________

**FIT**

- Exercise at **60 - 70 percent** of maximum heart rate.

If you are in this category your rate should be between

60% of Max = _______________ 70% of Max = ____________

**MAXIMUM IMPROVEMENT REQUIRED**

- Exercising in the training zone, which is **75 - 85 percent** of maximum heart rate.

If you are in this category your rate should be between

70% of Max = _______________ 85% of Max = ____________

**QUICK TESTS**
These tests are also a good indicator of fitness:
Number of sit-ups in one minute _________________
Number of push-ups in one minute _________________
Number of star-jumps in one minute _________________
Now take pulse again: Beats in 15 seconds _______ Heart Rate______
Take the remainder of the session to come up with activities that would suit clients at each level

<table>
<thead>
<tr>
<th>UNFIT</th>
<th>FIT</th>
<th>MAXIMUM IMPROVEMENT</th>
</tr>
</thead>
<tbody>
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</table>
Landscape Gardener
You have to design a garden that meets the following criteria (the garden has been marked out, you are encouraged to use the plants provided).

- $5000 budget
- Planting should follow the instructions for distances apart.
- Plants list the average amount of water they require.
- The client has requested that the garden needs to be watered using his 3 watering cans with each being used once each. Their capacity is ____ + _____ + _____ =

Sketch your design on the next page showing positions of plants.
Use this page to work out your budget and watering restrictions.

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Cost</th>
<th>Number</th>
<th>Total</th>
<th>Water</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

Total cost

Total water used
Garden Design
(12m x 16m)
Landscaping Prices
Agapanthus – clumping bush $12 each should be planted 50 cm apart min of 6 – water 0.5L each
Bottlebrush (Miniature) $20 each 1.5m apart 200ml each
Camellia (Variegated) $40 each 1m apart 500ml each
Daisy - White (large) $30 each 70cm apart 1L each
Eucalyptus $60 each 5 m apart 300ml
Fig (Standard) $25 each 90cm apart 350mL
Gerbera $15ea 0.6m apart 800mL
Herbaceous Border $2.50ea 20cm apart (min of 20 ) 1L for 10plants
Succulents Very Large $200 must have 2m of space 100mL
Fountain $600 – leave 6m around, uses 5L of water
Stones are $10 each and 20cm diameter
Paving tiles are $8 each and 30cm square
Mulch – if you can reduce the water required by 50% (if you do the whole garden). Mulch costs $15/m²