SHARP

Worksheet 3 – Measurement

Mathematical Literacy – Grade 12

1. Convert the following units of measurement to the given unit.

   a) $17\ mm \rightarrow m$

   b) $10458\ g \rightarrow tons$

   c) $3\ hours\ 21\ minutes \rightarrow seconds$

   d) $0.905\ km \rightarrow cm$

   e) $12\ 182\ 400\ seconds \rightarrow days$

   f) $2.5\ days \rightarrow minutes$

2. Danielle is going to bake some vanilla cupcakes that she wants to sell to raise money for charity. Use the recipe on the right to answer the questions that follow.

VANILLA CUPCAKES

Ingredients

185g butter
220g castor sugar
3 extra-large eggs
3ml vanilla essence
80ml water
80ml milk
300g cake flour
20ml baking powder

Butter Icing

80g butter
115g icing sugar
15ml boiling water
1 tub vermicelli
for garnishing

MAKES 24 CUPCAKES

   a) Danielle does not have a 20 ml measuring spoon so she decides to use a teaspoon. How many teaspoons ($5ml$) of baking powder does Danielle need for one batch of cupcakes?

   b) How many batches of cupcakes does Danielle need to make to produce 120 cupcakes?

   c) Calculate how many eggs you would need to use to make 120 cupcakes.

   d) How many millilitres of milk does Danielle need to make 120 cupcakes?

   e) How many **litres** of milk does Danielle need to make 120 cupcakes?

   f) If Danielle only has 640g of butter, how many full batches of cupcakes can she make?

   g) Danielle's oven uses ℃ but the recipe tells her to set the oven to $425°\text{F}$, what temperature should Danielle set the oven to in ℃? $(℃ = (°\text{F} - 32) \div 1.8)$

   h) Danielle and her friends all volunteer to bake cupcakes but Danielle offers to make one big batch of icing. Calculate how many kilograms of icing sugar she needs to make enough icing for 912 cupcakes?

   i) A batch of 24 cupcakes costs R 46.00 to make, excluding the icing. Calculate how much it would cost to bake 912 cupcakes.

   j) Danielle sells 912 cupcakes and brings in R 16 872. Calculate the selling price of 1 cupcake.

   k) The icing for all the cupcakes cost R 816 to make, calculate the total amount of money that Danielle was able to donate to charity.

3. Clint is planning on building a new house for his family. Below are the proposed dimensions of the house. Use the information given below to answer the questions that follow.

a) Clint wants to tile the bathroom floor; calculate the area he needs to tile.

b) How many 550 mm x 550 mm tiles does Clint need to tile the bathroom?

c) The tiler can lay tiles at a rate of $0.784m^2$ per hour. How long will it take him to tile the bathroom? (Round off to the nearest minute.)

d) The builder recommends to Clint that he buys 10% more tiles than required in case of breakages. The tiles he likes are R 234 for a box of 6 tiles. How much does Clint spend on tiles?

e) Calculate the cost of tiling the bathroom per meter squared. Include the cost of the labour (R 130/hour or part thereof), grouting ($1 \times 5Kg\ bag$ @ $R\ 46.90$), adhesive ($3 \times 20\ Kg\ bags$ @ $R\ 69.90/bag$) and spacers ($1\ pack\ 10\ mm\ spacers$ @ $R\ 14.50$) needed for the entire job.

f) The walls of the house are 8 feet tall, convert this to meters. $1\ foot = 0.3048\ m$

g) Calculate the total area of all the walls of the bathroom.

h) Clint is told that one litre of paint will cover $10\ m^2$ of the wall. Calculate the number of litres of paint he needs to do 2 coats of paint on the bathroom walls.

i) Clint can buy paint in a $1l$ can ($R\ 149$) or a $2.5l$ can ($R\ 259$). How much will the paint for the bathroom walls cost?

4. Clint has decided to put carpets into the bedrooms. Use the diagram from Question 3 and the given information to answer the questions that follow.

   a) Calculate the total area of the two bedrooms.

   b) Carpet is sold in rolls that are 3.66m wide and can be cut to any length. Determine how many metres of carpeting Clint needs to buy to carpet the two bedrooms.

   c) Calculate the area of the carpet that is wasted due to off cuts.

   d) Carpeting requires the following:

      Underlayment $R\ 75\ per\ linear\ meter$

      2 x Rolls of adhesive $R\ 95\ each$

      Carpeting $R\ 890\ per\ linear\ meter$

      Labour $R\ 1\ 200\ per\ day$

      Calculate the total cost of carpeting the bedrooms if the job takes 1 day.

5. Body Mass Index (BMI) is a number calculated from a person's mass and height. BMI number is plotted on the CDC BMI-for-age growth charts (for either male or female) to obtain a percentile ranking. BMI-for-age weight status categories and the corresponding percentiles are shown in the following table.

Body Mass Index (BMI) Chart for Adults

Obese (>30) | Overweight (25-30) | Normal (18.5-25) | Underweight (<18.5)

HEIGHT in feet/inches and centimeters

WEIGHT		4'8"	4'9"	4'10"	4'11"	5'0"	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10"	5'11"	6'0"	6'1"	6'2"	6'3"	6'4"	6'5"
lbs	(kg)	142cm		147	150	152	155	157	160	163	165	168	170	173	175	178	180	183	185	188	191	193	196
260	**(117.9)**	**58**	**56**	**54**	**53**	**51**	**49**	**48**	**46**	**45**	**43**	**42**	**41**	**40**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**32**	**31**
255	(115.7)	57	55	53	51	50	48	47	45	44	42	41	40	39	38	37	36	35	34	33	32	31	30
250	**(113.4)**	**56**	**54**	**52**	**50**	**49**	**47**	**46**	**44**	**43**	**42**	**40**	**39**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**30**
245	(111.1)	55	53	51	49	48	46	45	43	42	41	40	38	37	36	35	34	33	32	31	31	30	29
240	**(108.9)**	**54**	**52**	**50**	**48**	**47**	**45**	**44**	**43**	**41**	**40**	**39**	**38**	**36**	**35**	**34**	**33**	**33**	**32**	**31**	**30**	**29**	**28**
235	(106.6)	53	51	49	47	46	44	43	42	40	39	38	37	36	35	34	33	32	31	30	29	29	28
230	**(104.3)**	**52**	**50**	**48**	**46**	**45**	**43**	**42**	**41**	**39**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**30**	**29**	**28**	**27**
225	(102.1)	50	49	47	45	44	43	41	40	39	37	36	35	34	33	32	31	31	30	29	28	27	27
220	**(99.8)**	**49**	**48**	**46**	**44**	**43**	**42**	**40**	**39**	**38**	**37**	**36**	**34**	**33**	**32**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**
215	(97.5)	48	47	45	43	42	41	39	38	37	36	35	34	33	32	31	30	29	28	28	27	26	25
210	**(95.3)**	**47**	**45**	**44**	**42**	**41**	**40**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**28**	**27**	**26**	**26**	**25**
205	(93.0)	46	44	43	41	40	39	37	36	35	34	33	32	31	30	29	29	28	27	26	26	25	24
200	**(90.7)**	**45**	**43**	**42**	**40**	**39**	**38**	**37**	**35**	**34**	**33**	**32**	**31**	**30**	**30**	**29**	**28**	**27**	**26**	**26**	**25**	**24**	**24**
195	(88.5)	44	42	41	39	38	37	36	35	33	32	31	31	30	29	28	27	26	26	25	24	24	23
190	**(86.2)**	**43**	**41**	**40**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**26**	**26**	**25**	**24**	**24**	**23**	**23**
185	(83.9)	41	40	39	37	36	35	34	33	32	31	30	29	28	27	27	26	25	24	24	23	23	22
180	**(81.6)**	**40**	**39**	**38**	**36**	**35**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**24**	**23**	**22**	**22**	**21**
175	(79.4)	39	38	37	35	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21
170	**(77.1)**	**38**	**37**	**36**	**34**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**24**	**23**	**22**	**22**	**21**	**21**	**20**
165	(74.8)	37	36	34	33	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	21	20	20
160	**(72.6)**	**36**	**35**	**33**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**24**	**23**	**22**	**22**	**21**	**21**	**20**	**19**	**19**
155	(70.3)	35	34	32	31	30	29	28	27	27	26	25	24	24	23	22	22	21	20	20	19	19	18
150	**(68.0)**	**34**	**32**	**31**	**30**	**29**	**28**	**27**	**27**	**26**	**25**	**24**	**23**	**23**	**22**	**22**	**21**	**20**	**20**	**19**	**19**	**18**	**18**
145	(65.8)	33	31	30	29	28	27	27	26	25	24	23	23	22	21	21	20	20	19	19	18	18	17
140	**(63.5)**	**31**	**30**	**29**	**28**	**27**	**26**	**26**	**25**	**24**	**23**	**23**	**22**	**21**	**21**	**20**	**20**	**19**	**18**	**18**	**17**	**17**	**17**
135	(61.2)	30	29	28	27	26	26	25	24	23	22	22	21	21	20	19	19	18	18	17	17	16	16
130	**(59.0)**	**29**	**28**	**27**	**26**	**25**	**25**	**24**	**23**	**22**	**22**	**21**	**20**	**20**	**19**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**
125	(56.7)	28	27	26	25	24	24	23	22	21	21	20	20	19	18	18	17	17	16	16	16	15	15
120	**(54.4)**	**27**	**26**	**25**	**24**	**23**	**23**	**22**	**21**	**21**	**20**	**19**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**15**	**14**
115	(52.2)	26	25	24	23	22	22	21	20	20	19	19	18	17	17	16	16	16	15	15	14	14	14
110	**(49.9)**	**25**	**24**	**23**	**22**	**21**	**21**	**20**	**19**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**15**	**14**	**14**	**13**	**13**
105	(47.6)	24	23	22	21	21	20	19	19	18	17	17	16	16	16	15	15	14	14	13	13	13	12
100	**(45.4)**	**22**	**22**	**21**	**20**	**20**	**19**	**18**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**14**	**14**	**14**	**13**	**13**	**12**	**12**	**12**
95	(43.1)	21	21	20	19	19	18	17	17	16	16	15	15	14	14	14	13	13	13	12	12	12	11
90	**(40.8)**	**20**	**19**	**19**	**18**	**18**	**17**	**16**	**16**	**15**	**15**	**15**	**14**	**14**	**13**	**13**	**13**	**12**	**12**	**12**	**11**	**11**	**11**
85	(38.6)	19	18	18	17	17	16	16	15	15	14	14	13	13	13	12	12	12	11	11	11	10	10
80	**(36.3)**	**18**	**17**	**17**	**16**	**16**	**15**	**15**	**14**	**14**	**13**	**13**	**13**	**12**	**12**	**11**	**11**	**11**	**11**	**10**	**10**	**10**	**9**

Note: BMI values rounded to the nearest whole number. BMI categories based on CDC (Centers for Disease Control and Prevention) criteria.

www.vertex42.com BMI = Weight[kg] / (Height[m] x Height[m]) = 703 x Weight[lb] / (Height[in] x Height[in])

a) A 17-year-old female feels that she is overweight. Her weight is 65.8 Kg and height is 1.63 m. Construct a logical argument to support or refute concerns about her lifestyle choices.

b) What is the weight status of an adult who is 1,8m tall and weighs 104.3kg?

c) Complete the table below:

Use the following formula: $BMI = \frac{Weight(Kg)}{Height(m) \times Height\ (m)}$

Name	Weight	Height	BMI	Weight Status
Moe	66	1.65		Normal
Curly		1.91	27	
Larry	57	1.8		

6. Miriam lives in Cape Town and she has decided to go on holiday to Port Elizabeth.
   a) Cape Town is 748 Km from Port Elizabeth, calculate how far this is in meters.
   b) How long will it take Miriam to get to Port Elizabeth if she travels at an average speed of $100\ Km/h$? (Round off to the closest half an hour)
   c) What time does Miriam have to leave Cape Town if she wants to stop for 1 hour and 15 minutes and she wants to arrive in Port Elizabeth at 16:30?

7. Oliver has just completed matric and he has decided to travel to the Netherlands for his matric holiday. His parents buy his plane tickets but he has saved up to pay for travel expenses.
   Oliver's travel expenses are as follows:

   Accommodation: € 21.90 per night
   Transport: € 5.20 per day
   Meals: €4.80 per meal (3 times a day)
   Drinks/Entertainment: € 9.00 per day
   Attractions: € 12.00 per day

   a) Calculate the total cost of staying in the Netherlands for one day and one night.
   b) Oliver has saved R 8000.00 for expenses on his trip, convert this amount to Euros.

   € 1 = R 14.48

   c) Calculate how many full days Oliver can stay in the Netherlands before he runs out of money.
   d) Oliver has € 282.50 to spend on gifts for his family and friends while he is in the Netherlands, how much money did he save (in Rands) for shopping?
   e) Calculate how much money (in Rands) Oliver will have left over after his trip. Note he spends all the money that he saved for gift shopping.
   f) How much will Oliver spend on accommodation during his trip?

8. At the end of the holidays Mrs Smith is waiting to fetch her 3 children from the train station. Each of her daughters went on holiday to a different place and will be returning at a different time.
   a) Lucy is arriving at 16:42 and Jane is arriving at 18:03. How long will Lucy have to wait with her mom for Jane to arrive?

b) Grace has to wait 16 minutes for Jane to arrive, at what time did Grace arrive at the train station?

c) Grace's train left at 10:05 in the morning. How long did Grace spend on the train?

d) The average speed of a train is 32Km/hour. How far did Grace travel on the train.

e) Mrs Smith knows that trains can sometimes arrive at the station early so she arrived at the station 25 minutes early for Lucy's train. How long did she spend waiting at the train station?