Key Stage 2- Presented by Dr Wahyudi for further improvement

Measurement and Relation (K2MR)

Topics

Introducing angle and measuring it (K2MR1)

Standards:

Introducing angle by rotation, enabling measuring and acquire fluency using the protractor (K2MR1-1)

Standards	Sample Tasks for understanding the standards
K2MR1-1 Introducing angle by rotation,	Task 1
enabling measuring and acquire fluency using the protractor i Compare extent of rotation and introduce degree as a unit for measuring angle	The following diagram show how a bookstore looks from above. Chang entered the bookstore alone, expecting to find his friends. However, there was a book self in the way.
Recognize right angle is 90 degrees, and adjacent angle of two right angles is 180 degrees, and 4 right angles is 360 degrees	Putri Dewa Chang Sara
iii Acquire fluency in measuring angles	
 using the protractor iv Draw equivalent angles with addition and subtraction using multiples of 90 degrees v Appreciate measurement of angles in geometrical shapes and situations in their life¹ 	 Help Chang! Which one of his friends that he can see from his position without moving? How do you determine that information? Three students use lines to help them determine which parts of the bookstore is invisible to Chang.
	These are their answers: 1 1 1 1 1 1 1 1 1 1 1 1 1

¹ Conservation of angles will be re-learnt in triangle under key stage 2 Plane Figures and Space Solids

when being introduced to the concept of angle is that the size of the angle is related to the length of the legs. It usually stems from introducing angle as space or area between two lines intersecting at 1 point. Therefore, the teachers have to introduce angles as the amount of turn between two lines.
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Topics

Exploring and utilizing constant relation (K2MR2)

Standards:

Exploring equal constant relation with utilization of letters to represent placeholders² (K2MR2-1)

	Standards	Sample Tasks for understanding the standards							
K2MF	2-1 Exploring equal constant relation	Task 2							
with	utilization of letters to represent								
place	holders ³	Erik	ka wan	ts to l	ouy a	box o	f brow	nies.	It contains 12
		brownies in a mix of chocolate and cheese brownies.							
i	Explore two possible unknown	Turn out, Erika can choose herself how many chocolate							
	numbers such that their sum (or	or	cheese	brow	nies sh	ne war	nts to	have i	n a box! Now
	difference /product/quotient)	she	's gett	ing co	onfuse	d bec	ause	there	are so many
	is constant, ⁴ for example \Box + Δ =12 (\Box	pos	sibilitie	s. Plea	ise hel	p Erika	n!		
	and Δ are placeholders).								
ii	Use letters instead of placeholder $^{\circ}$	1.	If the	numbe	er of ch	nocolat	te brov	vnies i	s represented
	(empty box) to derive equivalent		by □ a	nd the	numb	er of c	heese	browr	nies as 0, the
	relation		expres	sion t	hat rep	presen	t the si	ituatio	n above is
iii	Understand the laws for operations					□ + 0	o = 12		
	(e.g. associative, commutative and		Find tl	ne corr	rect nu	mber	that ca	in repla	ace \square and $ o$.
	distributive etc.) to explain the	2.	The br	ownie	s box l	ooks li	ke the	follow	ving.
	simpler way of calculation								
iv	Appreciate the use of diagrams								
	such as number lines and area to								
	represent								
	relation when finding solutions								-
		(Note: the teacher should distributes square piece							
		of paper in the color of brown and yellow to the							
		students, representing chocolate and yellow							
			browr	ies. Ea	ich stu	dents	should	have	12 of each)

² The idea for the use of Numbers and Operations (key stage 2) in finding the easier ways of calculations with the idea of rules of calculations

³ The idea for the use of Numbers and Operations (key stage 2) in finding the easier ways of calculations with the idea of rules of calculations

⁴Constants of multiplication and division, corresponds proportionality in multiplication table at key stage 1 under number and operations. Constant of addition and subtraction are treated in key stage 1 under pattern, and data representation

⁵ Place folders is introduced in key stage 1

Put the brownies inside combinations of chocola that you can have.	the box. Find how many ate and cheese brownies			
What can you say about the correct numb can replace and o?				
Now, let say that Erika c and 12 pcs boxes. She c chocolate or cheese bro even buy multiple box! of brownies should be e	an choose between 6, 10, an put whatever number of wnies in one box. She can However, the total number qual to 60.			
If the number of chocola by \Box , the number of che number of boxes as Δ , f represent the situation	ate brownies is represented eese brownies as 0, and the and the expression that above.			
Find all possible numbe Δ.	r that can replace □, 0, and			
mon misconceptions:				
isitioning from concr ables can be difficult to s conception here is treati stant where there is only /quotient/product.	ete number to abstract students. The most common ng placeholders/variables as y one possible solutions to a			
can be intervened by -life situation and explor n place holders.	developing expression from ing different possibilities for			

Topics

Extending measurement of area in relation to perimeter (K2MR3)

Standards:

Introducing area and produce formula for rectangle (K2MR3-1) Extending area of rectangle to other figures to derive formula (K2MR3-2)

Standards	Sample Tasks for understanding the standards					
K2MR3-1						
Introducing area and produce formula for rectangle	Provide 3 different size of square units and a rectangle. Ask students to cover the rectangle using the square units.					
 (i) Compare extent of area and introduce unit for area, and distinguish it from perimeter (ii) Introduce one square centimeter as unit for area and its addition and Subtraction (iii) Investigate area of rectangles and squares and produce the formula of area (iv) Extend square centimeter to square meter and square kilometer to measure 						
large area	 How many square units cover the rectangle? 					

 (v) Convert units of area with fluency and use appropriate units (vi) Draw the equivalent size of rectangle area with the composite value (vii) Appreciate the using of areas in their life such as comparison of land size 	 Why do you have different result? How to get the same result of area? This question direct students to realize the importance of standart units of area Remind students the standart units that they have known before Using the paper provides, what kind of standart unit can be used? Using one square centimeter as unit for measuring the area of the paper. How many one square units do you need to cover the paper? Try to measure the area of a square paper provided by teacher
	 How many one square units do you need to cover the square paper? Compare the number of one square units needed to cover the rectangle and square paper. Observe the number of one square units related to rectangle and square's sides. At the end of this activity, students are able to determine the formula of rectangle and square area. Investigate the area of a sport field at school trough outdoor activity.
 K2MR3-2 Extending area of rectangle to other figures to derive formula Explore and derive formula for the area of parallelogram by changing its shape to rectangle without changing its area Explore and derive formula for the area of triangle by bisecting a rectangle into two triangles without changing its area Appreciate the idea of changing or dividing shapes of rectangle, parallelogram, or/and triangle for deriving the area of other figures 	 Task 3-2 (Note: prior to the lesson, teachers should prepare pieces of paper cut in the shapes of parallelogram) Dena is a potter and a person just ordered parallelogram shaped tiles from her. However, they changed their order and wanted a rectangle shaped tiles instead. To minimize the loss, Dena decided to use the parallelogram tiles as the material for the new rectangle tiles. Measure the base and the height of the parallelogram.

	1	
iv Use the formulas to calculate areas	2.	Sketch a rectangle on a paper, whose length equals
in their daily life		the base of the parallelogram and height equals the
		width or parallelogram.
	3.	Cut the parallelogram paper into pieces and make a
		mosaic by sticking the paper pieces to the rectangle.
	4.	What is your conclusion?

Extending measurement of volume in relation to surface (K2MR4) Standards :

Introducing volume from area and derive formula for cuboid (K2MR4-1) Extending volume of cuboid to other solid figures to derive formula (K2MR4-2)



Standards	Sample Tasks for understanding the standards
	- Observe the number of one centimeter sides of
	cuboid related to cuboid and cubes's sides. At
	the end of this activity, students are able to
	determine the formula of cuboid and cube
	volume.
K2MR4-2	Task 1
Extending volume of cuboid to other solid	Provide a cuboid (A) and triangular prism (B)
figures to derive formula	
(i) Extend the formula of cuboid as area x	
height for exploring solid figures such as	
prism and cylinder	
(ii) Extend the formula of volume for prism	
and cylinder to pyramid with	w
experiment of square pyramid and cone	1
(III) Utilize the formulas to calculate volume	
	В
	Students prior knowledge: volume formula of cuboid
	-ask students about the relationships between figure
	A and B
	- guide students to realise that B is a half of A (the
	prism with the different base) the base area of B is a
	Volume $A = 1 \text{ w h}$
	Volume B = $\frac{1}{2}$ volume A= $\frac{1}{2}$. I.w.h= $\frac{1}{2}$ base area.h
	Trapezoidal prism
	_
	Base
	, , , , , , , , , , , , , , , , , , ,



Sample Tasks for understanding the standards
What is the volume formula of pyramid and cone?
S V

Approximating with quantities (K2MR5)

Standards :

Approximating numbers with quantities depending on necessity of contexts (K2MR5-1)

Standards	Sample Tasks for understanding the standards				
 K2MR5-1 Approximating numbers with quantities depending on necessity of contexts (i) Understand the ways of rounding such as round off, round up and round down 	\$79				
 (ii) Use rounding for thinking about the quantity with contextually necessary approximation (iii) Critique over approximation beyond the context with sense of quantity such as relative size of unit 	\$22				
	 Round the price to the nearest tens place. Which one is closer to \$79, \$70 or \$80 Which one is closer to \$22, \$20 or \$30 Rounding is close to reasonable approximation. Finally, students can conclude that the price of the shoes is about \$80 and bag is about \$20 				

Topic:

Extending Proportionality to Ratio and Proportion (K2MR6)

Standards :

Extending proportional reasoning to ratio and percent (K2MR6-1) Extending proportional reasoning to proportion (K2MR6-2)

Standards	Sample Tasks for understanding the standards
K2MR6-1	Task 1:
Extending proportional reasoning to ratio and percent i. Understand ratio as relationship between two same quantities or between two different quantities (the later idea is rate)	The table below shows the number of chocolate some students have. Complete the table and answer the questions. If the ratio of the number of chocolate that Randy has to the number that Lia has is 1 : 2, how many candies do Randy and Lia have?

Standard	ls	Sample Tasks for understanding the standards								
ii. E> su iii. Ur ra iv. Ur v. Ap	Apress the value of ratio by quotient tich as rate of two different quantities inderstand percent as the value of tio with same quantity inderstand proportion with ratio oply the rule of three in using ratio	Randy Amel Lia Putu Fenty Total Chocolate 15 12 18 75 The table can help teachers to provide questions relate to ratio such as: a. What is the ratio of chocolate that Randy has to th of Putu? b. What is the ratio of chocolate that Amel has to th of Fenty? c. What is the ratio of chocolate that Fenty has to th of the total?						Total 75 ns related has to that as to that has to that has to that		
		e.	have t What to that	to that o is the ra t of the	of the to atio in p total?	otal? ercent o	of choc	olate th	at Lia has	
KMR6-2		Task 2								
Extendin proportic	ng proportional reasoning to on	Some problems provided to students come from daily life problems as followed:				om daily				
i. Ex mi an	xtend proportional reasoning on ultiplication tables as equal ratio nd understand proportions	a. Febby spends 20 minutes to finish reading 4 pages of a book. How long does it take for her to finish reading 35 pages?								
ii. Ur an the	nderstand proportion by multiple nd constant quotient, not changing e value of ratio	 (This is the example of direct proportion) b. Fifteen workers can build a house in 27 days. many days will it takes 35 workers working a same rate to build the same house? (This is the example of inverse proportion) 								
iii. De pr	emonstrate simple inverse oportion by constant product									
iv. E> se v. Us pr th	kpress proportion in mathematical entence by letters and graph se properties of proportionality to edict and explain phenomenon in eir daily life	 Students can solve both of the problems using multiplication tables by teachers' guidance Students should have opportunity to solve proportion problems given by teachers by themselves. a. How can students solve the problems? b. How can the students discuss and com their answers/strategies with their friends? 						sing ? compare nds?		

Producing New Quantities by per Unit (K2MR7)

Standards :

Producing new quantities by per unit with the idea of average such as population density and speed (K2MR7-1)

Standards		Sample Tasks for understanding the standards		
K2MR7-1 Producing new quantities by per unit with the idea of average such as population density and speed		A teacher introduces the concept of average to students by giving example that related to students' lives Task 1: Teacher wants to find who has the best student		
i.	Introduce average as units for distribution and comparison of different sets of values	between Indro and Aris in mathematics. Four mathematics tasks have been given to them and below are the scores of their mathematics tasks:	v	
ii.	Introduce population density with the idea of average and appreciate it for comparison	Indro's scores:		
iii.	Introduce speed with the idea of average and appreciate it for comparison	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		
iv.	Appreciate using diagrams such as number lines and tables to decide the operations on the situations of	5 70 Total Score 375		
v.	Comparing on the context of different quantities with the idea of average as rate	Task Score 1 90 2 75		
vi.	Apply the idea of measurement per unit quantity in different context	3 80 4 55 5 85 Total Score 385		
		To know who the best student is, students are asked measure the average score of both of them. The formula to find the average is: $Average = \frac{Sum \ of \ all \ given \ observations}{Number \ of \ observations}$		
		 How can students measure the average of score usin that formula? Can students solve problems using the concept of average? 	ig of	
		Task 2: Population Density Relating the population density and the concept of average, teacher can start giving word problem to students as follows:		

school by cycling. The distance from their home to school is 200 metres			
Students	Time	Speed	
Richie	5 minutes	m/s	
Andy	seconds	4 m/s	
Denny	3 minutes	m/s	

Investigating the Area of Circle (K2MR8)

Standards : Areas of circle are discussed through relationship between radius and the circumference (K2MR8-1)

Standards		Sample Tasks for understanding the standards			
K2MR8-1		Task 1:			
Areas of circle are discussed through relationship between radius and the circumference		To investigate relationship between the diameter of circle and its circumference teacher can give below activity to students. Students are asked to find five			
i. (Investigate relationship between the diameter of circle and its circumference using the idea of proportion	circular objects around them, for example:			
ii. I t	Investigate area of a circle by transforming into triangle or parallelogram and find the formula of circle				
iii. I t iv. I	Estimate the area of inscribed and out scribed shapes based on known formula of area Enjoy to estimate the area of irregular shapes with fluency in their life	Students then measure the diameter and circumference of those circular objects. Teacher can provide thread or rope and ruler to help students to measure the circumference and diameter of circles			
		Objects Diameter Circumference <u>circumference</u> diameter			
		Disk			
		Wheel			
		Clock			
		Dart board			
		Plate			
		Students can complete the table above after measuring the diameter and circumference of each object. Implementing this activity, students can conclude the relationship between circumference and diameter of			

circle. The ratio of circumference and diameter of each object will be always same, known as π .

Task 2: Area of Circle

Teacher can give opportunity to students to find the formula of the area of circle by exploring the circular objects. Teacher can use context in daily life for example pizza. Teacher makes a pizza model and cut it into 16 slices of pizza. Teacher then asks students to rearrange their pizza circle into triangle, parallelogram, trapezoid, and rectangle. Students then explore their parallelogram, triangle, trapezoid and rectangle to find the formula of the area of circle. For example:

Students arrange their pizza circle into parallelogram.



And exploring their parallelogram to find the area of circle.



Students then find that:

Area of circle = area of parallelogram

Area of circle = $base \times height$

Area of circle = $\pi r \times r$

Area of circle = πr^2

• How can students find the formula of the area of circle using the formula of the area of triangle, rectangle or trapezoid?

Task 3: Area of inscribed and out scribed shapes

Find the area of the shaded area, if the diameter of the circle is 14 cm.



Topic : Exchanging local currency with currency in ASEAN community (K2MR9)

Standards : Exchanging local currency in ASEAN community with the idea of rate (K2MR9-1)

Standards	Sample Tasks for understanding the standards
K2MR9-1	
Exchanging local currency in ASEAN community	
with the idea of rate	
(i) Extend the use of ratio for currency	Task 1:
exchange (rate of exchange)	Discuss whether or not they are the same kind
	of problem and solve them:

	 a. If 3 students' pocket money 5000 IDR each. How much would the 8 students? b. When we compare 5000 IDR to 2 THB (1 THB = 415,13 IDR). How many times Rp5000,00 is more or less than 2 THB?
(ii) Apply the four operations for money in appropriate notation in their life	Task 2: Kenneth buys 2 kg of durians fortnightly for 180 PHP. What would it cost if he would buy for 3 month?
(iii) Appreciate value of money	Task 3: Siti and Tara are sibling. They have different savings. Their savings are cut due to the excursion. Siti's saving is cut from RM 70 to RM 50. Tara's saving is cut from RM 30 to RM 10. Tara says the cutting is unfair. Why would she says this unfair if they both drop RM 20? Discuss your opinion about this problem.

Topic : Extending the relation of time and use of calendar in their life (K2MR10)

Standards : Extending the relation of time and use of calendar in their life (K2MR10-1)

	Standards	San	ple Tas	ks for	unders	standin	g the	standards	S
K2MR1	10-1		•				•		
Extend	ing the relation of time and use of calendar in								
their life	e								
		Task	1:						
(1)	convert time in 12 hour system with	I tak	e my c	ar to	the re	pair s	nop t	or month	lly ab
	and vice versa	takes	exactly	two ho	ar to ti nurs an	ne sno nd sixte	pati. Penmi	nutes Ho	UTT WW
		many	minute	s befor	e 4 pm	do the	e chec	king finish	ייי ז?
					•			U	
(ii)	Investigate the number in calendar to relate	Task	<u>ე</u> .						
(11)	days, week, month and year using the idea	The f	∠. ollowina	figure	is a co	boy of a	an Oct	ober, 201	17
	of number patterns	caler	dar.						
			2	017	-	ТЛР	ED		
			2	017	OC	TOB	ER		
		5UM	2 2	017 TUE 3		TOB THU	ER FRI	SAT Z	
		<u>sur</u> 1	2 2	017 TUE 3	OC WED 4	ТОВ тни 5	FRI 6	SAT Z	
		<u>su</u> ⊧ 1 8	2 2 9	017 тие 3 10	OC 4 11	ТОВ тни 5 12	ER 6 13	SAT <u>7</u> <u>14</u>	
		5UM 1 8	2 2 9	017 тие 3 10	OC wed 4 11	тов ^{тни} 5 12	ER 6	SAT Z 14	
		5UN 1 8 15	2 MON 2 9 16	017 тие 3 10 17	OC 4 11 18	ТОВ тни 5 12 19	ER 6 13 20	<u>SAT</u> <u>Z</u> <u>14</u> <u>21</u>	
		1 1 8 1⊃	2 9 16 23	017 ^{тие} 3 10 17 24	OC 4 11 18 25	тов тни 5 12 19 26	ER FRI 6 13 20 27	<u>SAT</u> 7 <u>14</u> <u>21</u> 28	
		5UN 1 8 15 22	2 MON 2 9 16 23	017 з 10 24	OC 4 11 18 25	тов ^{тни} 5 12 19 26	ER 6 13 20 27	SAT Z 14 21 28	
		50N 1 8 22 29	2 9 16 23 30	017 TUE 3 10 17 24 31	OC 4 11 18 25	ТОВ ^{тни} 5 12 19 26	ER FRI 6 13 20 27	SAT 7 14 21 28	
		50H 1 8 22 29	2 9 16 23 30	017 тие 3 10 17 24 31	OC 4 11 18 25	тов 5 12 19 26	ER 6 13 20 27	SAT Z 14 21 28	
		1 8 22 29 Sour	2 9 16 23 30 22	017 тие 3 10 17 24 31 www.fr	VED 4 4 111 18 25	THU 5 12 19 26	ER 6 13 20 27	SAT Z 14 21 28	

(iii) Appreciate the significance of various calendars in their life	 http://www.free-printable-calendar.com/printable-2017-october-calendar.html Choose three pairs of the numbers. For example the box above. Try adding them together. Keep going until you have made all the pairs. a. What do you notice about the answers? b. What is the relation among them and numbers pattern? Task 3: In October 31 will be conducted a Halooween party. Tara plans to prepare two days before the day. How to find what day it is from the date by using Calendar? Discuss your opinion the use of calender to solve some problems in your daily life.

Topic : Converting quantities in various system of units (K2MR11)

Standards : Converting measurement quantities on international and non-international system with idea of base 10 (K2MR11-1)

Standards	Sample Tasks for understanding the standards
K2MR11-1	
Converting measurement quantities on international and non-international system with idea of base 10	
 (i) Convert measurement system of meter and kg with prefixes deci-, centi-, and milli, and with deca-, hecto-, and kilo- 	Task 1: There is a rope that is 9 m long and weighs 720 g. How many <i>mg</i> does this rope weigh per 1 m? Let's develop an expression by drawing a diagram and a table below.
	0 Weight
	0 1 m 9 m X Weight Length X
(ii) Convert measurement system of liter with cubic centimetre	Task 2: Kenneth and Luna went to the supermarket to buy milk. The milk is sold in 1.5 L (Milk A) and 250 cm ³ (Milk B). The cost of Rp12.000,00 for Milk A and Rp2.200,00 for Milk B. Which one is cheaper to buy?
(iii) Converting measurement area using are (a) and hectare (ha) with square meter	Task 3: In the kindergarten sized 0.5ha, there are a building and a playground with two sandboxes.

	 Thirty children are playing in a 0.14are sandbox. In the second sandbox sized 10m², there are nine children. a. Which sandbox is more crowded? b. If the area of building is 140 m². Find the area of the playground in square meter.
(iv) Convert measurement of local quantities with standard quantities	Task 4: Gibran is using a nonstandard weighs to measure a scissors. Two scissors weighs as seven erasers. If one eraser weighs 2.8 ounces, how much do the three scissors weighs in ounces?
 (v) Understand the unit system with power, such as meter, square meter and cubic meter 	Task 5: The volume of a cube with 1 cm edges is called 1 cubic centimetre and expressed as 1 cm ³ . Find how many cm ³ equals to m ³ by answering the following questions.
	1 m Layers 1 cm
	How many 1 cm ³ cubes will line up for width and length of 1 m ³ 's base?
	 a. How many layers are there? b. What is the total of 1 cm³ cubes and the volume in cubic centimetre? c. What can you conclude the relation between cm³ and m³. Can you answer how many cm³ equals to m³?

Topic : Showing relationship using Venn diagram (K2MR12)

Standards : Using Venn diagram to show relationships of numbers and figures (K2MR12-1)

Standards	Sample Tasks for understanding the standards
K2MR12-1 Using Venn diagram to show relationships of numbers and figures	
 (i) Show relationship of square, rectangles, rhombus, parallelogram, trapezoid and quadrilateral by using Venn diagram 	Task 1: Draw a Venn diagram showing the relationships between square, rectangles, rhombus, parallelogram, trapezoid and quadrilateral. Then, explain the relationship based on your diagram by your own words.
(ii) Show relationship of numbers	Task 2 Given the sets: