BOOK 1

mathsquad

Key Skills Training - L3

name: _____

Welcome to the Key Skills Training Program. These sheets are designed to give you multiple opportunities to learn and revise key mathematical skills. Completing these sheets will help you become equipped with the skills you need to be a successful user of mathematics in school and also every day life. The following points will help you get the most out of the program. Enjoy!

- The first two pages of each sheet are technology free and you are **not allowed** to use a calculator.

- The third page of each sheet is technology active and you are **allowed** to use a calculator.

- When you see the ✎ symbol include some working to support your answer. This could involve a calculation, annotating a diagram or an explanation of your thought process.

- All fractional answers must be given in simplified form.

- You may be able to complete very few questions or almost all of them, it doesn't matter. As long as you give your best effort and try to improve each time you are maximising your success!

- If you feel that some or all of these questions aren't suitable for you, have a chat with your teacher.

Every skill within this booklet connects to an online skill development page containing instructional videos and practice questions. Head to the website below to learn more!

Webpage: https://mathsquad.org/KS3

Time to get started on Sheet 1. Turn the page and complete the questions on pages 2, 3 and 4.

mathsquad

Step 1: ★ Start a timer ★ Complete the 30 questions in the Quick Quiz ★ Stop the timer ★ Record your time.

Times Tables

1. $\boxed{3} \times 7 = 21$

2. $32 \div \boxed{8} = 4$

3. $1 \times \boxed{5} = 5$

4. $\boxed{50} \div 5 = 10$

5. $10 \times \boxed{5} = 50$

6. $120 \div \boxed{12} = 10$

7. $\boxed{9} \times 11 = 99$

8. $77 \div \boxed{11} = 7$

9. $10 \times \boxed{7} = 70$

10. $\boxed{1} \times 1 = 1$

Key Skills 2

11. $^-1 + 3 = \mathbf{2}$

12. $^-3 + {}^-4 = \mathbf{^-7}$

13. $1^1 = \mathbf{1}$

14. $\sqrt{9} = \mathbf{3}$

15. $\sqrt{46 - 10} = \mathbf{6}$

16. Prime factorisation of $54 = \mathbf{2 \times 3^3}$

17. HCF of 40 and 90 = $\mathbf{10}$

18. LCM of 4 and 9 = $\mathbf{36}$

19. $5 = \dfrac{\boxed{\mathbf{35}}}{7}$

20. $\frac{6}{7} - \frac{1}{10} = \mathbf{\frac{53}{70}}$

Key Skills 2 (continued)
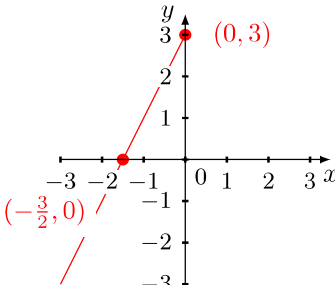
21. $\frac{6}{11} \times \frac{2}{5} = \mathbf{\frac{12}{55}}$

22. $\frac{1}{3} \div \frac{12}{9} = \mathbf{\frac{1}{4}}$

23. Rounded to 1 dp. $6.857 = \mathbf{6.9}$

24. $69 \div 100 = \mathbf{0.69}$

25. $\frac{7}{25} = \mathbf{28}\%$

26. $0.8 + 4.65 = \mathbf{5.45}$

27. $0.86 \times 0.2 = \mathbf{0.172}$

28. $0.14 \div 0.04 = \mathbf{3.5}$

29. If $x = 50$, $\frac{x}{10} = \mathbf{5}$

30. $\frac{x}{8} = 5$, $x = \mathbf{40}$

Time:

Quick Quiz working out space

Step 2: ★ Complete these 23 questions			
★ Do not use a calculator ★ Include working out when you see the ✎ symbol ★ Simplify all fractional answers			

1. a. $^{-}3 - 4 = \mathbf{^{-}7}$

   b. $^{-}3 + 5 = \mathbf{2}$

   c. $^{-}4 - ^{-}1 = \mathbf{^{-}3}$

   d. $1 + ^{-}6 = \mathbf{^{-}5}$

2. a. $^{-}4 \times ^{-}6 = \mathbf{24}$

   b. $^{-}4 \times 7 = \mathbf{^{-}28}$

   c. $10 \div ^{-}2 = \mathbf{^{-}5}$

   d. $^{-}12 \div 2 = \mathbf{^{-}6}$

3. Simplify the following, giving your answer in index form where appropriate.
   a. $9^4 \times 9 = \mathbf{9^5}$

   b. $2^7 \div 2^2 = \mathbf{2^5}$

   c. $(6^8)^2 = \mathbf{6^{16}}$

4. a. Simplify 11:110

   1:10

   b. Divide 44 into the ratio 8:3

   32 and 12

5. ✎ a. Calculate $5\left(-\frac{1}{2}\right)$

   $\mathbf{-\frac{5}{2}}$ **or** $\mathbf{-2\frac{1}{2}}$

   b. Calculate $-4 + \frac{5}{2}$

   $\mathbf{-\frac{3}{2}}$ **or** $\mathbf{-1\frac{1}{2}}$

6. a. ✎ Convert $\frac{10}{11}$ to a decimal. Round to 4 decimal places where necessary.

   $\mathbf{\frac{10}{11} \approx 0.9091}$

   b. Is $\frac{10}{11}$ a recurring or terminating decimal?
   recurring

7. ✎ Evaluate 2.98×2.5

   7.45

8. ✎ Increase 33 by 6%.

   $\mathbf{1.06 \times 33 = 34.98}$

9. Simplify the following.
   a. $6 - 1 - 5x$
   $\mathbf{-5x + 5}$

   b. $6x \times 6$
   $\mathbf{36x}$

10. Simplify, give answers with positive powers.
    a. $\frac{a^7}{a^5} = \mathbf{a^2}$

    b. $\frac{2a^5}{5a^3} = \mathbf{\frac{2a^2}{5}}$

11. a. Expand $4(5x + 5)$
    $\mathbf{20x + 20}$

    b. Expand $-3(5x + 1)$
    $\mathbf{-15x - 3}$

12. a. Factorise $6x + 8$
    $\mathbf{2(3x + 4)}$

    b. Factorise $-22 + 11x$
    $\mathbf{-11(2 - x)}$

13. ✎ Substitute $x = 6$ into $5x - 16$ and evaluate.

    $\mathbf{5 \times 6 - 16}$
    $\mathbf{= 14}$

14. ✎ Substitute $x = 3$ into $5(x - 1)$ and evaluate.

    $\mathbf{5 \times (3 - 1)}$
    $\mathbf{= 10}$

15. ✎ Substitute $x = -4$ into $2x - 1$ and evaluate.

    $\mathbf{2(-4) - 1}$
    $\mathbf{= -9}$

16. ✎ Substitute $x = \frac{3}{7}$ into $-4x - 2$ and evaluate.

    $\mathbf{-4\left(\frac{3}{7}\right) - 2}$
    $\mathbf{= -\frac{26}{7}}$ **or** $\mathbf{-3\frac{5}{7}}$

17. ✎ Solve the following:

    $$5 + 9x = 59$$
    $\mathbf{-5} \mid 9x = 54$
    $\mathbf{\div 9} \mid x = 6$

18. ✎ Solve the following:

    $$14 = 7(x - 1)$$
    $\mathbf{2 = x - 1}$
    $\mathbf{x = 3}$ **or** $\mathbf{3 = x}$

19. ✎ Solve the following:

    $$6x - 8 = 5x - 4$$
    $\mathbf{x - 8 = -4}$
    $\mathbf{x = 4}$

20. ✎ Solve the following:

    $$11 = 3(x - 4)$$
    $\mathbf{11 = 3x - 12}$
    $\mathbf{x = \frac{23}{3}}$ **or** $7\frac{2}{3}$

21. Consider the linear relationship

    $$y = 2x + 3$$

    Complete the missing value in each coordinate so each satisfies the given relationship.

    $(0, \mathbf{3})$

    $\left(\mathbf{-\frac{3}{2}}, 0\right)$

22. Sketch the graph of $y = 2x + 3$. Label the axis intercepts using your answers from Question 21 to assist you.

23. The points below satisfy a linear relationship. Complete the table and rule below.

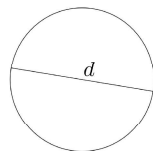 | x | -1 | 0 | 1 | 2 | 3 |
    |---|---|---|---|---|---|
    | y | -6 | **1** | **8** | **15** | 22 |

    $$y = \mathbf{7x + 1}$$

3

Step 3: ★ Complete these 6 questions ★ You may use a calculator ★ Include working out when you see the ✎ symbol

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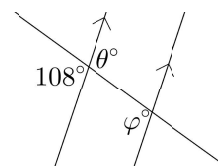24. ✎ To the nearest whole number calculate the area of the parallelogram.

19.6*mm*

7.8*mm*

9.8*mm*
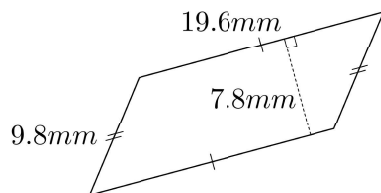
$A \approx$ **153 mm^2**

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25. ✎ The circle below has a diameter of 17.2cm. Calculate the following, giving answers to 2dp. where appropriate.

d

a. radius = **8.6cm**

b. circumference =

$\quad$ **$2 \times \pi \times 8.6 \approx 54.04$cm**

c. area =

$\quad$ **$\pi \times 8.6^2 \approx 232.35$cm^2**
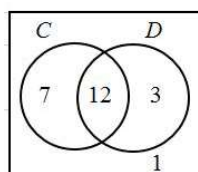
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26. Consider the diagram below.

$\theta°$

108°

$\varphi°$

a. State the size of the unknown angles.

$\quad \theta° =$ **108** $\qquad \varphi° =$ **108**

b. What is the relationship between θ and φ?

$\quad$ **alternate**

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27. Calculate the following probabilities using the two-way table below.

	C	C'	Total
D	4	4	8
D'	13	6	19
Total	17	10	27

a. P(D)=$\frac{8}{27}$

b. P(C and D)=$\frac{4}{27}$

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28. Calculate the following probabilities using the Venn diagram below.

C $\quad$ D

7 $\quad$ 12 $\quad$ 3

1

a. P(C)=$\frac{19}{23}$

b. P(not D)=$\frac{8}{23}$

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29. ✎ Calculate the following statistics for the below data set

$$3, 4, 2, 6, 6$$

a. median = **4**

b. mean to 1 dp. = **4.2**

c. mode = **6**

d. range = **6-2=4**

Step 4: ★ Complete any additional weekly tasks in the space below ★

Step 1: ★ Start a timer ★ Complete the 30 questions in the Quick Quiz ★ Stop the timer ★ Record your time.

Times Tables

1. $\boxed{7} \times 9 = 63$

2. $11 \div \boxed{11} = 1$

3. $9 \times \boxed{11} = 99$

4. $\boxed{54} \div 6 = 9$

5. $10 \times \boxed{9} = 90$

6. $99 \div \boxed{9} = 11$

7. $\boxed{2} \times 7 = 14$

8. $63 \div \boxed{7} = 9$

9. $8 \times \boxed{1} = 8$

10. $\boxed{10} \times 7 = 70$

Key Skills 2

11. $4 - 6 = \mathbf{-2}$

12. $-1 - -1 = \mathbf{0}$

13. $9^2 = \mathbf{81}$

14. $\sqrt{49} = \mathbf{7}$

15. $31 + 9^2 = \mathbf{112}$

16. Prime factorisation of $12 = \mathbf{2^2 \times 3}$

17. HCF of 10 and 96 = $\mathbf{2}$

18. LCM of 7 and 5 = $\mathbf{35}$

19. $5 = \dfrac{\boxed{\mathbf{15}}}{3}$

20. $\frac{3}{5} + \frac{3}{40} = \mathbf{\frac{27}{40}}$

Key Skills 2 (continued)
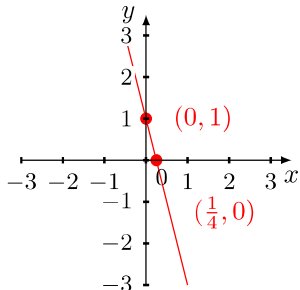
21. $\frac{2}{3} \times \frac{1}{2} = \mathbf{\frac{1}{3}}$

22. $\frac{3}{6} \div \frac{7}{10} = \mathbf{\frac{5}{7}}$

23. Rounded to 2 dp. $0.0607 = \mathbf{0.06}$

24. $41 \times 100 = \mathbf{4100}$

25. $0.64 = \mathbf{64}\%$

26. $4.69 - 3.9 = \mathbf{0.79}$

27. $3.67 \times 0.5 = \mathbf{1.835}$

28. $3.54 \div 0.6 = \mathbf{5.9}$

29. If $x = 18, \frac{x}{2} = \mathbf{9}$

30. $x + 3 = 4, \ x = \mathbf{1}$

Time:

Quick Quiz working out space

6

Step 2: ★ Complete these 23 questions

★ Do not use a calculator ★ Include working out when you see the ✎ symbol ★ Simplify all fractional answers

|			

1. a. $3 - 5 =$ **−2**
 	
b. $-1 + 3 =$ **2**
 	
c. $6 - {-1} =$ **7**
 	
d. $-3 + {-4} =$ **−7**
	2. a. $-6 \times 6 =$ **−36**
	
	b. $3 \times {-8} =$ **−24**
	
	c. $24 \div {-4} =$ **−6**
	
	d. $-40 \div {-8} =$ **5**
		3. Simplify the following, giving your answer in index form where appropriate.
		    a. $(4^4)^5 =$ **4^{20}**
		    b. $\frac{5^8}{5^5} =$ **5^3**
		    c. $8^7 \times 8^5 =$ **8^{12}**
			4. a. Simplify 35:45
			    7:9
			b. Divide 44 into the ratio 3:8
			    12 and 32

5. ✎ a. Calculate $-9\left(\frac{2}{3}\right)$
 	
    −6
 	
b. Calculate $-2 + \frac{7}{6}$
 	
    $-\frac{5}{6}$
	6. a. ✎ Convert $\frac{1}{9}$ to a decimal. Round to 4 decimal places where necessary.
	
	    $\frac{1}{9} \approx 0.1111$
	b. Is $\frac{1}{9}$ a recurring or terminating decimal?
	    recurring
		7. ✎ Evaluate 0.13×0.197
		
		    0.02561
			8. ✎ Increase 36 by 70%.
			
			    $1.7 \times 36 = 61.2$

9. Simplify the following.
a. $-6z - 4 - 7z$
    −13z − 4
 	
b. $-3 \times 4z$
    −12z
	10. Simplify, give answers with positive powers.
	a. $(x^2)^2 =$ **x^4**
	
	b. $2y^4 \times 5y^3 =$ **$10y^7$**
		11. a. Expand $3(6x - 2)$
		    18x − 6
		
		b. Expand $-12(x - 2)$
		    −12x + 24
			12. a. Factorise $20x + 16$
			    4(5x + 4)
			
			b. Factorise $-24 - 30x$
			    −6(4 + 5x)

13. ✎ Substitute $x = 2$ into $6x + 2$ and evaluate.
 	
    $6 \times 2 + 2$
    $= 14$
	14. ✎ Substitute $x = 84$ into $\frac{x}{7} - 7$ and evaluate.
	
	    $\frac{84}{7} - 7$
	    $= 5$
		15. ✎ Substitute $x = 6$ into $1 - 9x$ and evaluate.
		
		    $1 - 9 \times 6$
		    $= -53$
			16. ✎ Substitute $x = \frac{1}{10}$ into $-5x + 3$ and evaluate.
			
			    $-5\left(\frac{1}{10}\right) + 3$
			    $= \frac{5}{2}$ or $2\frac{1}{2}$

17. ✎ Solve the following:
 	
$\begin{array}{r\|l} & 6x - 21 = 3 \\ \textbf{+21} & 6x = 24 \\ \textbf{÷6} & x = 4 \end{array}$
	18. ✎ Solve the following:
	
	$2 = \dfrac{x + 6}{4}$
	    $8 = x + 6$
	    $x = 2$ or $2 = x$
		19. ✎ Solve the following:
		
		$4x - 1 = 3x + 1$
		    $x - 1 = 1$
		    $x = 2$
			20. ✎ Solve the following:
			
			$3x - 5 = 7x - 20$
			    $15 = 4x$
			    $x = \frac{15}{4}$

|		

21. Consider the linear relationship
 	
    $y = -4x + 1$
 	
Complete the missing value in each coordinate so each satisfies the given relationship.
 	
    $(0, \textbf{1})$
 	
    $\left(\dfrac{\textbf{1}}{\textbf{4}}, 0\right)$
	22. Sketch the graph of $y = -4x + 1$. Label the axis intercepts using your answers from Question 21 to assist you.
	
	$(0, 1)$
	$\left(\frac{1}{4}, 0\right)$
		23. The points below satisfy a linear relationship. Complete the table and rule below.
		
		| x
			-1	0	1	2	3 |
							|---|---|---|---|---|---|
							| y | **1** | -4 | **−9** | -14 | **−19** |
							
							    $y = \textbf{−5x − 4}$

7

Step 3: ★ Complete these 6 questions ★ You may use a calculator ★ Include working out when you see the ✎ symbol

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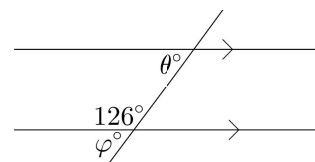24. ✎ To the nearest whole number calculate the volume of the rectangular prism.

8.9cm 8cm 15.8cm
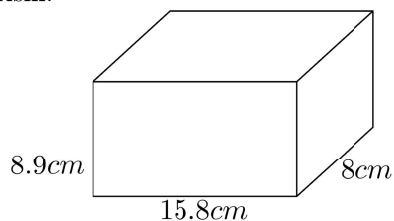
$V \approx$ **1125 cm^3**

25. ✎ The circle below has a radius of 18.4cm. Calculate the following, giving answers to 2dp. where appropriate.

r
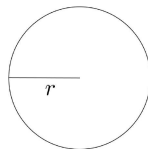
a. diameter = **36.8cm**

b. circumference =
   $2 \times \pi \times 18.4 \approx 115.61$cm

c. area =
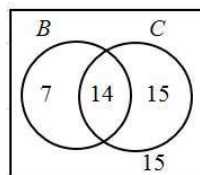   **$\pi \times 18.4^2 \approx 1063.62$cm^2**

26. Consider the diagram below.

$\theta°$ 126° $\varphi°$

a. State the size of the unknown angles.
   $\theta° =$ **54** $\varphi° =$ **54**

b. What is the relationship between θ and φ?
   corresponding

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27. Calculate the following probabilities using the two-way table below.

	B	B′	Total
C	13	11	24
C′	2	1	3
Total	15	12	27

a. P(C)=$\frac{8}{9}$

b. P(B and C)=$\frac{13}{27}$

28. Calculate the following probabilities using the Venn diagram below.

B C 7 14 15 15

a. P(B)=$\frac{7}{17}$

b. P(B or C or both)=$\frac{12}{17}$

29. ✎ Calculate the following statistics for the below data set

$$7, 2, 6, 8, 9, 6, 1, 6$$

a. median = **6**

b. mean to 1 dp. $\approx$ **5.6**

c. mode = **6**

d. range = **9-1=8**

Step 4: ★ Complete any additional weekly tasks in the space below ★