

BEDOK SOUTH SECONDARY SCHOOL END-OF-YEAR EXAMINATION 2023

1EXP

CANDIDATE NAME

CLASS

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REGISTER NUMBER

MATHEMATICS

Candidates answer on the Question Booklet. No Additional Materials are needed

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

You may use a HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.

Write your answers and working on the spaces provided.

Show all your working on the same page as the rest of the answer.

The use of an electronic calculator is NOT ALLOWED.

Omission of essential working will result in loss of marks.

You are reminded of the need for clear presentation in your answers.

The number of marks is given in brackets [] at the end of each question or part question. The total of the marks for this paper is **40**.

	Examiner's Use	
Penalty	Question No.	
Units et	udvkal	Marks
Accuracy	adyna	-1 -2
Presentation		
Sub Total	Total	40

4052/01 10 Oct 2023

1 hour

Answer ALL Questions

[1]
[1]

2 Observe the following numbers a, b and c on the number line below. Determine whether the following expressions are positive or negative. Explain your answer in words.



3

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Answer:

2

[3]

- 4 Find
 - (a) the square of $7^6 \times 19^3$.

(b) the cube root of the answer in (a). Leave your answers in index notation.

studykaki.com Answer: (a) (b) [1] (b) [1] 5 (a) Simplify $\frac{5(3n-4.5)}{3} - \frac{-(2n+9)}{2}$. Studykaki.com

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(b) Hence show that $\frac{5(3n-4.5)}{3} - \frac{-(2n+9)}{2}$ is a multiple of 3 for all positive integers *n*.

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Answer: (b) working shown above [1]

- 6 A student solved the following equation to find the value of x, where a is a constant.
 - Step 1: $\frac{x+1}{2} + \frac{x-a}{3} = 1$ Step 2: $\frac{3(x+1)}{6} + \frac{2(x-a)}{6} = 1$ Step 3: 3(x+1) + 2(x-a) = 1Step 4: 3x + 3 + 2x - a = 1Step 5: 5x = a - 2Step 6: $x = \frac{a-2}{5}$
 - (a) Identify the steps where the errors occur and show the correct working below.

[3]

(b) If the solution of the equation is x = 2, find the value of a.

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Answer: (b) $a = \dots$ [1]

- 7 Singapore and Melaka, Malaysia are 360 km apart. A man took 2 hours to drive to a rest stop and took a 30-min break. He then took another 1½ hours to reach Melaka. He used up 20 litres of petrol for the journey. Find
 - (a) his average speed for the journey,

Tan.

(b) the petrol consumption rate in km/l.



- 8 Mr Tan's monthly salary is 3x. Mrs Tan's monthly salary is \$600 more than Mr Tan's. Their son's monthly salary is two-thirds of Mrs. Tan's.
 - (a) Write down an expression for Mrs Tan's monthly salary in terms of x.
 - (b) Express their son's monthly salary in terms of x.
 - (c) If the sum of their monthly salaries is \$10600, find the monthly salary of Mr



9 (a) Express the following as a single fraction in its simplest form. 3(t-1) + 5(t+3)

•		
2	- T -	3

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studykaki.com Answer:

- (b) Factorise the following expressions completely. Simplify the expression first if necessary.
 - (i) 3ax 6ay + 21a
 - (ii) 6(kt 3d) 2(2kt 6d)



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(ii)..... [2]

10 In the diagram, AB//CD//EF and $\angle DCF = 35^{\circ}$.

Find the values of *a* and *b*. Write the mathematical statements clearly.





- 11 The diagram shows a parallelogram *ABCD*. Points *E* and *F* lie on *BC* and *AD* respectively such that CF // EA, BA = BE, $\angle ADC = 110^{\circ}$ and $\angle AEB = 5a^{\circ}$.
 - (a) Find the value of *a*.
 - (b) Is *ABCF* a trapezium? Explain with reasons.



- The diagram shows the graph of a function y against x. 12
 - (a) The points (0, a) and (b, 0) lie on the graph. Use the graph to find the values of aand b.
 - (b) Write down the equation of the graph in the form of y = mx + c.



studykaki.com Answer: (a) a =......; b=......

- [2]
 - (b) [2]

End of Paper



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Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

You may use a soft *pencil* for any *diagrams* or *graphs*.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.

Write your answers and working on the spaces provided.

Give non-exact numerical answers correct to **3** significant figures or **1** decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question. For π , use your calculator value or 3.142.

The use of an electronic calculator is allowed.

Show all your working on the same page as the rest of the answer.

Omission of essential working will result in loss of marks.

You are reminded of the need for *clear presentation* in your answers.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 60.

	-
Question No.	
ldykak	Marks
Tetal	
	Question No.

4052/02 03 Oct 2023

1 hr 30 min

Answer ALL Questions

1 (a) Simplify each of the following ratios.

(i)
$$a: b = \frac{2}{5}: 2\frac{2}{5}$$

- (ii) b:c = 0.70: 0.350
- (b) Hence find the ratio a : b : c.
- (c) Al, Bo and Kat share \$590 in the ratio 7: 12 : 40.
 - Find Al's share of the money.

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- 2 The maximum load of a cargo lift is 400 kg. There are five boxes whose masses in kg are 76.8, 81.4, 75.3, 81.8 and 86.4.
 - (a) Estimate the total mass of the five boxes by rounding off each mass to one significant figure.
 - (b) Based on the estimation in (a) and the maximum load of the lift, is it safe to transport all these boxes at the same time?
 - (c) Verify your answer in (b) by calculating the actual total mass of all five boxes.

Explain if your estimation in (a) was a good and credible method. If not, how can it be improved?

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	Answer:	(a)		• • • • • • • • • • • •	 [2]
(b)					[1]
(c)					
	•••••	••••••	•••••		 [2]

- 3 Mrs Tan has some money to buy fruits. She can buy n mangoes at \$1.60 each and have 80 cents left. Alternatively, she can buy (n+10) apples at \$0.70 each and have 10 cents left.
 - (a) By forming an equation in *n*, solve and show that n = 7.
 - (b) How much money does Mrs Tan have for buying fruits?
 - (c) If Mrs Tan buys 3 mangoes and uses the rest of the money to buy apples, how many apples can she buy?



- 4 At a food centre, there are three drink stalls. On a certain day, Stall A sold 175 glasses out of 200 glasses of iced milo, Stall B sold 85% of its 220 glasses of iced milo and Stall C sold 180 glasses of iced milo which was 80% of its total number of glasses of iced milo.
 - (a) Which stall sold the greatest number of glasses of drinks? How many glasses were sold?
 - Which stall sold the highest percentage of its glasses of drinks? What was its (b)
 - percentage?
 - (c) Which stall prepared the most glasses of drinks? What was its number?

[1] (b) *Stall*;% [1] (c) Stall; glasses [1]

5 (a) In this kite, WX = WZ, XY = YZ and WY bisects $\angle XWZ$. Find the values of x and y.



Answer: (a) $x = \dots; y = \dots$ [3]

(b) In the diagram, a cross-section of a camera is shown. All measurements are in centimetres. Find the area of the shaded region in square centimetres. Take π = 3.142.



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BP~77

6 The diagram shows a bolt which has a hexagonal head and a cylindrical body. The hexagonal head is a prism of base area 10.4 cm^2 and thickness of 0.5 cm. Th length of each side of the hexagon is 2 cm.

The cylindrical body has a diameter of 2 cm and a length of 5 cm.



Taking π = 3.142, find the volume of the bolt, (a)

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Answer: (a)

.....[3]

(b) the total surface area of the bolt. Answer: (a)

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Answer:

- 7 The diagram shows a regular hexagon *ABCDEF* and a regular octagon *ABPQRSTU*. Find
 - (a) $\angle CBP$,
 - (b) $\angle CAP$.



Answer	(a)	 [2]
	(b)	 [2]

(a) The lengths of three sides of an isosceles ΔABC are x cm, y cm and z cm.
 (a) Given that x is an odd prime integer, y is a whole number yet it is not a prime nor a composite number, and 5(z + 1) - 3(z - 2) = 21,
 Find the values for x, y and z.



Answer: (a) $x = \dots; y = \dots; z = \dots$ [3]

8

(b) Construct a $\triangle PQR$, in which $\angle QPR = 45^\circ$, PR = 4 cm and PQ = 5.5 cm.

(i) Construct the ΔPQR . The point *P* has been drawn for you.

	P	[3]
(ii)	Measure $\angle PRQ$ and name the type of triangle $\triangle PQR$ is.	
	Answer: $\angle PRQ = \dots^{\circ};$	
	ΔPQR is a	[2]
(iii)	Does $\triangle PQR$ have a line of symmetry? If there is, draw and label the line of symmetry line with a dashed line ().	
	Answer: (iii) as shown above	[1]
(iv)	Indicate how many rotational symmetries ΔPQR has.	

Answer: (iv) rotational symmetry =..... [1]

9 Two branch managers of a fast-food chain called Super Juicy Chicken (SJC) presented the following line graphs showing the annual sales of their fried-chicken.



- (a) The manager of branch A claims that his store had a higher percentage increase in sales compared to branch B from 2020 to 2022. Do you think his claim is correct? Explain your answer by showing calculations to support your explanation.
- (b) Explain what could be done to the graphs to better compare the sales of both branches more effectively.

Answer:

(a)	
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	[3]
(B)	
	[2]

Answer the whole question on a piece of graph paper.

A piece of fish is kept in a refrigerator. Its temperature, $y \circ C$, at time t hours is given by this equation y = 20 - 4t for $0 \le t \le 6$.

The following table of values was recorded during the experiment:

t (hours)	-0	1	2	4	6
y (temperature °C)	20	16	q	4	-4

(a) Find the value of q.

10

- (b) Using a scale of 2 cm to 1 unit on the horizontal x-axis and 2 cm to 2 units on the vertical y-axis, draw the graph of y = 20 − 4t for 0 ≤ t ≤ 6.
- (c) State the gradient of the graph and explain what the value of the gradient means.
- (d) Use the graph to find out the number of hours it takes for the temperature of the fish to reach the freezing point.

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[1]

[3]

[2]

[1]

[1]

Answer: (a) $q = \dots$

(d) $t = \dots$ hours

(b) Graph paper next page

(e) What does the constant term, 20, in the equation represent?

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(e) .	 	 	 	•••	 	 	 	•••	•••	 	•••	 ••••	 	••••	

(c) gradient isand this value means that

11

.....



EM1 EOY P1 2023 Answer Scheme

Qns	Mark scheme	Marks/remarks	
1a	$\frac{2}{7}$, -5.6, π , 1.2222	[B1] Award B1	only when all
		are written	
1b		[B1]	
2a	(a) $\frac{a}{b}$		
	A negative integer		
	because a is -ve but b is +ve.	D1	
	A-ve number divide by +ve number gives a -ve value.	BI	
2h	$a > a^2$		
20	(b) $\frac{1}{\sqrt{c}}$		
	<i>a</i> is -ve but when it is squared, <i>a</i> ² becomes +ve,	B1	
	so +ve divided by +ve gives +ve integer	B2	
3	$\frac{5}{-1} \times (-\frac{3}{-1})^3 \div (-\frac{3}{-1})$	darles	Award B1 if
		<u>U y Ka</u>	answer is
	$\left[\frac{-3}{8} \times \left(-\frac{27}{8}\right) \times \left(-\frac{3}{3}\right)^{\text{(for finding cube and 'flip' the fract)}}\right]$	[M1]	given
	$=\frac{5}{2} \times 9$ (for simplifying)		without
	8 _45	[M1]	working
	8		
	$=5\frac{5}{8}$	[A1]	
4a	$(7^6 \times 19^3)^2$		
	=		
	$7^{12} \times 19^{6}$	DI	
4b	dazka ki com	BI	
40	$3\sqrt{7^{12} \times 19^6}$		
	$=$ 74 \times 10 ²		
	/ ^ 17	B1	
5a	$\frac{10(3n-4.5)}{(Common Denominator)} - \frac{-3(2n+9)}{(Common Denominator)}$	either step =	
	6 6 6 10(3n-4.5)+3(2n+9)	[M1]	
	6		
	$=\frac{30n-45+6n+27}{6}$ (Combined into 1 equation with	[M1]	
	changed sign (-) to (+))		
	26m - 19		
		dyle	bi on
	$=\frac{6(6n-3)}{(correct simplification)}$	UJAd	MI.CU.
	$6 \qquad \qquad$	[A1]	
	01 - 0n - 3		

	5b	$\frac{6(6n-3)}{6n-3}$ or $6n-3$		[M1]	
		$\binom{6}{3(2n-1)}$ shown!		No need	
		(Factorise obtained expression with multiple of 3)		statement.	
	6a	Step 3: $3(x + 1) + 2(x - a) = 6$		[M1]	
		(denominator 6, RHS \times 6)			
5	ιu	Step 4: $3x + 3 + 2x - 2a = 6$ (expansion)		[M1]	
		Step 5: $5x = 3 + 2a$ (simplification)			
		On Ston 6, $\alpha = \frac{3+2a}{2}$		[M1] for	
		Or Step 6: $x = \frac{1}{5}$ (isolate x)		either step 5	
				or step 6	
	6b	$2 = \frac{3+2a}{r}$ (correct substitution)		[M1] ecf	
		10 = 3 + 2a			
		a = 35		[A1] Award	
				[B1] only if	
				answer	
				obtained	
			ST1	without	com
				working	UUUUUUUUUUUUU
	70	Average speed = total dist/total time		Overall penalise unit (II)	one
	/ a	= 360/4		time for entire ans	, one
		= 90 km/h		unit for this que	
				A1	
	7b	Petrol consumption = $360 \text{ km}/201$			
		= 18 km/l		AI	
	8a	Mrs Tan: $(600 + 3x)$		B1	
2	8b	Son: $\frac{2}{7}$ (600 + 3x) or (400 + 2x)		B1	
	8c	2		Ecf considered	
		$3x + 600 + 3x + \frac{1}{3}(600 + 3x) = 10600$		M1	
		6x + 600 + 400 + 2x = 10600			
		8x = 10600 - 1000			
		8x = 9600			
		x = 1200			
		Mr Tan earns \$3600		A1	
				Penalise unit (U) one time	e for
				entire qns.	
				Penalise presentation (P)	
				solve. E.g. deconstructed	into
				various steps	





BP~87

EM1 EOY P2 2023 Answer Scheme

	Qn	Answer with Mark Allocation	Remarks
	1a	(i) $a: b = \frac{2}{2}: 2\frac{2}{2}$	
		$=\frac{5}{2}\cdot\frac{12}{12}$ (×5)	
			DI
	լա		ВІ
		(ii) $b; c = 0.70; 0.350$ (×1000)	
		= 700:350	
		= 2:1	B1
	1b	Make <i>b</i> common	
		a:b 1:6	ecf
		b:c $(x3)$ 2:1	DI
		a:b:c 1:6:3	BI
	1c	59 units = \$590	
		$1 \text{ unit} = \frac{590}{1000}$	
		59 Al = 7 units	MI
		$=\frac{590}{2} \times 7$	dvkaki.cor
		59	
	20	-5/0 76.8 - 80 (all to 1 aft)	Al
	2a	81.4 = 80	IVII
		75.3 = 80.	
		81.8 = 80	
		86.4 = 90	
		Total = 80+80+80+80+90 = 410 kg	A1
	2h	It exceeded the maximum load, so it wont he safe to	D1
S 1		transport all together	BI
	2c	Total = 76.8 + 81.4 + 75.3 + 81.8 + 86.4 = 401.7	Al
		Exceeds the maximum limit by a bit.	
		It's a <u>suitable method as the results is still exceeding.</u>	B1
		Ur The difference is his hot on the last in the	
		hetter to round off to 2 significant 5	
		whole number instead more accurate	
		more number instead, more accurate.	

ſ	3a	Equation:			
		1.6n + 0.8 = 0.7(n + 10) + 0.1 (equation)	[M1]		
		1.6n + 0.8 = 0.7n + 7 + 0.1			
		1.6n - 0.7n = 7.1 - 0.8 (expand & simplified)	[M1]		
		0.9n = 6.3			
S	UU	$n = 6.3 \div 0.9 = 7$ (shown)	[A1]		
	3b	Money = $1.6(7) + 0.8 = 12	[A1]		
	3c	Apples amount = $12 - (3 \times 1.6) = 7.2$	[M1] ecf		
		Apples = $7.2 \div 0.7 = 10.3 \approx 10$	[A1] ecf		
	4a	Stall $A = 175$			
		Stall B = $0.85 \times 220 = 187$ [answer]	[M1 or B1]		
		Stall $C = 180$			
		477			
	4b	Stall A = $\frac{175}{200} \times 100\%$ = 87.5% [answer]	[M1/A1/B1]	1.:	
		Stall B = 85%	IUQYKa	KI.CO	
		Stall C: 80%			
	4c	Stall A= 200			1
		Stall B= 220			
		Stall C = $\frac{180}{80} \times 100 = 225$ [answer]	[M1/A1/B1]		
			answer		
	5a	Equation:			
		5y = 2y + 30	[M1]		
		3y = 30			
9	f 11				
		x + 6 = 2(x - 2)			
		x + 6 = 3x - 6 (average)	[M1]		
		-2r = -12			
		r = 6	[A1]		
		x = 0			
	5b	Area of rectangle = $15 \times 20 = 300$	[M1] either	Penalise	
	2.0	Area of trapezium = $\frac{1}{2}(2)(6+9)$	area of	missing	
		2 (2)(0 + 5)	rect/trapezium	units(U) and	
		=15		lack of	
		Area of sirely not shaded $= \pi(4.5)^2$	[M1] circle	accuracy	hm
		Area of circle not shaded $-\pi(4.5)^2$		(A).	
		- 03.0233			
					1

		Shaded region = 300 + 15 - 63.6255	[A1] ecf	
		= 251.37	Max 2 m only	
		$\approx 251 \text{ cm}^2 (3\text{sf})$	if any areas	
			are wrong	
21	- 1 1	dykaki com		
	6a	Volume of bolt = volume of head + cylinder		Penalise
		Head volume = base area x height	[M1]	missing
		$= 10.4 \times 0.5$		units(U) and
		$= 5.2 \text{ cm}^3$		lack of
				accuracy
		Cylinder volume = $\pi r^2 \times lenath$	[M1]	(A).
		$= 3.142 \times 1^2 \times 5$	[]	(
		$= 15.71 \text{ cm}^3$		
			[M1/A1] final	
		Total volume = $5.2+15.71$	answer award	
		$= 20.91 \text{ cm}^3$	max 2 m for	
		≈ 20.9 cm3	any wrong	K1.C0
			area.	
ł	6b	Surface area of bolt (minus ring/circle)	$[M1 = \pi r^2]$	Penalise
		= base area + (base area- πr^2) + 6 sides	M1 = 6 sides	missing
		$= 10.4 + (10.4 - 3.142 \times 1^2) + 6(2 \times 0.5)$	M1=2 base	units(U) and
		= 10.4 + 7.258 + 6	areas	lack of
		$=23.658 \text{ cm}^2$	M1 = curved	accuracy (A)
			lateral face	for whole
		Surface area of cylinder (minus one base area covered	M1 = sum	question
		by head)	total no of	
51		= 1 base area + curved lateral face	side faces]	
		$=(\pi r^2)+(2\pi r \times length)$	Max 4 for M1	
		$= (3.142 \times 1^2) + (2 \times 3.142 \times 1 \times 5)$	= 4 m	
		= 3.142 + 31.42		
		$= 34.562 \text{ cm}^2$	[A1: final	
			answer]	
		Total surface area = $23.658 + 34.562$		
		= 58.22	or	
		$\approx 58.2 (3sf) \text{ cm}^2$	01	
			$M_1 = 2$ has	
		Shortcut: no need to do this	areas	
		step 1: (base area- πr^2) because in SU	M1 = 6 sides	NI.CU
		step 2 (need to add it back)	WIT 0 Slues	
L		step 2 (need to dud it buck)		

		M1= curved		
	In step 1: 2 base areas + 6 sides	lateral face		
	step 2: curved lateral face	M1= sum total		
	step 3: add both values togetehr	no. of side		
		faces]		
8111	dykaki.com	A1: final		
		answer		
7a	$\angle CBA = (4 \times 180) \div 6 = 120^{\circ}$	M1		
	$\angle PBA = (6 \times 180) \div 8 = 135^{\circ}$			
	$\angle CBP = 360 - 120 - 135 = 105^{\circ}$ (angles at a point)	A1 (penalise pre	esentation (P)	
		for missing mat	hs property in	
		entire qns		
7b	$\angle CAB = (180 - 120) \div 2 = 30^{\circ}$ (base angles of isos	Ecf from 11(a)		
	triangle)	M1-Either angl	e correct	
	$\angle PAB = (180 - 135) \div 2 = 22.5$ (base angles of			
	isos triangle)			
	$(CAP = 30 + 22.5 = 52.5^{\circ})$	dizizo		
		ALYNO		
8a	x = odd (same as y or z)			
	y = 1	[B1]	.*	
	5(z+1) - 3(z-2) = 21			
	5z + 5 - 3z + 6 = 21			
	2z = 21 - 11	[M1]		
	z = 5			
	So $x = 5$	[B1]		
R f 11	dykaki.com			
8bi			Penalise	
	Q	[M1] 1 arc	presentation	
		drawn to get	(P) for lack	
	5.5 cm	point R	of labelling	
			of lengths	
		[M1] 1 arcs to	and points	
	45°	get point Q		
	P R			
	4 cm	[M1] 1 to	1.:	
	Model: of the answer SU	measure angle	KI.CO	DI
		v		

Shii	PDO = 0.00 [#accounted 07 00]	D (11	1	7
0011	21 KQ = 90 [#accepted 87-90]	[MI] must		
		measure from		
	ΔPQR is a right-angled/isosceles triangle.	drawing		
	[accepted based on above #: scalene, acute triangle]	[A1]		
8biii	It has one. (can use line bisector or angle bisector	[B1]	0	1
	method to obtain the symmetry line accurately)			
	[accepted based on #: no line of symmetry]			
8biv	None or 0	[B1]		1
				1
9a	It is not correct.	[B1]		1
	Based on my calculation branch A sales went up from	[[]		
	50 to 60 which is rise in $10^{10} \times 100 - 200$	[A1]		
	20 20 10000 which is lise in $10\frac{1}{50} \times 100 = 20\%$	[[[1]]]		
	While in B, it is $\frac{20}{60} \times 100 = 33.3\%$	[41]		
			1 •	
01-	The 2 second sec	Idvka	K1 CC	1
9D	The 2 graphs are plotted on the same range of number			
	or <u>same (scale along the) y axis</u> ,	[B1]		
	so we can see which branch has a <u>steeper/higher sales</u>			
	(gradient) than the other.	[B1]		
]
10a	q = 12	[B1]]
10b	See below			1
10c	Gradient = -4, it means that the temp is dropping by 4	[B1]		1
	every hour/unit time	Negatively		
11	dyza zi com	related to time		
10d	It takes $t = 5$ hours	[B1] from		
		graph to show		
		it		
10e	20 means that the original/starting temperature of the	[B1]		
	fish/ constant start value	[~1]		
	et1 [.]	ldvka	ki ed	
	σιι	LUJ ILO		
10b				
100				

