

-

: _____

1

A B C D

2020

D

A A
B B
C C D D
D

2

A B

C D

A

3 2 2*ab*

A 2*ab* B 2*ab* 2 C 2 D 2 2*ab*

2018-2019

D

D

4 ()

A B C D

2018

C

5

A B

C D

2017-2018

D

A

B

C

D .

D .

6 $a>0,b>0$, ()

A $(a+b)^4$ **B** $a^3+b^3-2ab^2$

C $a^2+b^2+2-2a+2b$ **D**

A $2-2$ $2.2.1$ 2

B

$a>0,b>0$,

$(a+b)()=2++4$.

$a^2+b^2+2-(2a+2b)=(a-1)^2+(b-1)^2 \geq 0$,

$a^2+b^2+2-2a+2b$.

$a-b, ()^2=a-b$.

$()^2=a+b-2$

$=a-b+2b-2$

$=(a-b)+2()$.

$a-b>0, 0$.

$(a-b)+2() a-b$,

.

$a<b, >0. <0$,

.

:B

7 .

A 3 B 2 C 1 D 0

2018-2019 A 5

C

.

1.

8

A B C D

2017-2018

D

D.

9

A B C D

2018-2019

B

A A
B B
C C
D D
B.

10

A 1 B 2 C 3 D 4

2018-2019

C

C.

11 , ()

A B

C D

2019 3

C

.
C.

12 ,
A B C D
2016-2017
A

.
A .
13
A B C D
2017
B
A , , ;B , , ;C , , ;D , , ; B.

14
A B C D
2015-2016
B

. B.

.
15
A B C D
2015-2016 4
C

A B D C.

16 $a b c t = 2^a 2^b 2^c t^{\frac{a+b}{c}} \log_2 t$

A 0 B $\log_2 3$ C 2 D 3

2015

C

$a b 2^b < 2^c = 2^a + 2^b \leq 2^b + 2^b = 2^{b+1} \Rightarrow b < c \leq b + 1$

$b c Z c b 1$

$\therefore 2^{b+1} = 2^a + 2^b \Rightarrow a = b = c - 1 \therefore t = \frac{a+b}{c} = 2 - \frac{2}{c}.$

$a t Z c \pm 1 \pm 2 t 0 1 3 4 (\log_2 t)_{\max} = \log_2 4 = 2$

17 $a=2^0 6 b=\log_2 2 c=\ln 0 6$

A a b c B b a c C c a b D b c a

2015-2016

A

A

18

A B C D

2011

B

.

B

19

A B C D

2020-2021

B

B

20

A B

C D

2019-2020

C

21

A B C D

2019

C

.

...

...

C

.

22 ()

A B C D

02—2020

D

q .

$q \ a_1 \ (0,1), a_2 \ (1,2), a_3 \ (3,4)$

×

$$a_4=a_3q \dots$$

D

23 $a\ b$

A B C D

2017-2018

D

$a\ b$

A

B

C ,

D

D

24

A B C D

2 2.8 1

C

.

$a \cdot b = 0$.
C

.

25 ()

A B C D

2018-2019

B

.

.

.

B .

.

26 $a = \log_2 3.6$ $b = \log_4 3.2$ $c = \log_4 3.6$ ()

A $a > b > c$ B $a > c > b$

C $b > a > c$ D $c > a > b$

2013

B

$$a = \log_2 3.6 = \log_4 3.6^2 \quad y = \log_4 x \quad 0 < x < +\infty$$
$$a = \log_2 3.6 = \log_4 3.6^2$$

$$y=\log_4x \quad 0+\infty$$

$$3.6^2 \cdot 3.6 \cdot 3.2 \log_4 3.6^2 \log_4 3.6 \log_4 3.2$$

a c b

B

27

A B

C D

2016 12

B

B

28

A B

C D

2011

A

A.

29

1

5

20

x

y

A B

C D

2020-2021

D

/ /

A B

C

D

D

30

A B C D

2.2

B

.

.

B.

31

A B

C D

2.1 2

B

A A
 B “ ” B
 C C
 D D B

32 .

A B

C D

224

B

C,D .

CD

B

33

A B C D

2018-2019 12

C

A. A
 B C D .
 C .

34
A B C D
 2019
 D

A.
 B.
 C.
 D..
 D .

35 $a\ b\ c\ d$
 $a > b\ c > 0\ ac > bc\ ac^2 > bc^2\ a > b$
 $a > b\ a > b > 0\ c > d\ ac > bd.$

A 1 B 2 C 3 D 4
 2.1 -
 A

$$c < 0 \quad ac^2 > bc^2 \quad c^2 > 0 \quad a > 0 > b \quad a^2 b^1 c^1 d^2$$

A

36

A B

C D

2019-2020 5

C

ABD C.

A A

B B

C C

D D

C

37

A B C D

B

B.

38

A $a^2 - b^2$ B $a^2 - b^2 - ac - bc$

C $a^3 - b^3$ D $a > b$

2018 12

C

C

39

A B

C D

2017-2018

B

B.

40

A B C D

2017-2018

A

B,D

C A.

41 x, y, z

A

B

C

D

2016 5

C

D

, , ,

, , A

, B

, , C , C

1 2

42 ()

A B C D

2016-2017

C

C.

43

A B C D

2017

B

B.

.

44 $a > b \frac{1}{a} > \frac{1}{b}$

$$\mathbf{A} \ a > b > 0 \ \mathbf{B} \ 0 > \frac{1}{a} > \frac{1}{b} \ \mathbf{C} \ a > 0 > b \ \mathbf{D} \ \frac{1}{a} > \frac{1}{b} > 0$$

2013-2014

C

$$2 \quad a < b \quad \therefore \frac{1}{a} > \frac{1}{b} \Rightarrow \frac{1}{a} - \frac{1}{b} > 0 \Rightarrow \frac{b-a}{ab} > 0 \quad a > b \quad ab < 0. \quad \mathbf{C}$$

$$\mathbf{45} \quad \mathbf{A} \ \mathbf{B} \quad \mathbf{a} \ \mathbf{b} \ \mathbf{c} \ \mathbf{d}$$

$$\mathbf{A} \ \mathbf{B}$$

$$\mathbf{C} \ \mathbf{D}$$

2015

D

$$M = \{x | a \leq x \leq b\} \quad N = \{x | c \leq x \leq d\} \quad a \leq b \leq c \leq d \quad a+b=c+d \quad ab \leq cd \quad 0 \leq a \leq b \leq c \leq d \quad M \cap N$$

$$M = \{x | a \leq x \leq b\} \quad a \leq b \quad ab \leq 0 \quad a \leq 0 \leq b \quad c \leq 0 \leq d$$

$$\therefore ab \leq cd \quad 0 \leq c \leq 0 \leq b \leq 0 \therefore \frac{a}{c} \leq \frac{d}{b} \therefore \frac{a-c}{c} \leq \frac{d-b}{b}$$

$$\therefore a+b=c+d \therefore a-c=d-b \therefore \frac{d-b}{c} \leq \frac{d-b}{b} \quad c \leq 0 \leq b \leq 0 \quad d-b \leq 0 \quad a-c \leq 0$$

$$a \leq c \leq 0 \leq d \leq b \quad M \cap N = N \quad M \cap N = \{x | a \leq x \leq c \text{ or } d \leq x \leq b\} = a \leq c \leq d \leq b \quad \mathbf{D}$$

46

$$\mathbf{A} \ \mathbf{B} \ \mathbf{C} \ \mathbf{D}$$

20102011

D

D.

“ ” . 1 2 3 4 .

47

A B

“ ” “ ”

A 1 B 2 C 3 D 4

2010

B

“ ” “ ”

B.

48

A B

C D

2019-2020

D

A B C .

A A B B C C D D .

D

.

49

.

A 1 B 2 C 3 D 4

2019-2020

B

B

50

A B C D

2020

C

C.

51

A B C D

C

C

52

A B

C D

2020

B

B

53 $a b$

A $a^2 b^2$ B C $\ln 2^a \ln 2^b$ D $ax^2 bx^2$

2018-2019

C

A,B,D, C

A $a b$ $a^2 b^2$ A

B $a b$ B

C $a b 2^a 2^b 0 \ln 2^a \ln 2^b$ C

D $x 0$ D

C

54

A B

C D

2019-2020

C

, .

A: , „ , A ;

B , , , B ;

C , , , , C ;

D: , „ , D ;

; ; .

55

A B C D $a^5 + b^5 < a^2b^3 + a^3b^2$

2018-2019

B

A C C B

$a \neq 0 \quad |a| \neq |b| \quad A$

$a=-2 \quad b=-1 \quad B$

$a \neq 0 \quad ab \neq C$

D .

B.

56

A B C D

2018-2019

D

D A,B,C .

$2>1>0>-1>-2,21=-1-2 \quad 2-1=1-2 \quad A B C$
 , D .

57 3

A B

C D

2019 4

D

. D.

58

A B C D

2016-2017

C

59

A	B	C	D	C
()				

A	B	C	D
		2018	
	B		

B.

60

A B C D

2019-2020

B

B.

61 ()

A B C D

2018-2019

C

$A,D, \quad B, \quad C.$

A
 B
 $C \quad R$
 $D \quad .$
 C

62 $a \ b \ c$
A $ac \ bc$ **B** $ac \ bc$ **C** **D**
2018-2019
D

A
B
C
D **D.**

63 $a \ b \ c \quad a \ b \ ac^2 \ bc^2 \ 0 \ a \ b \quad a \ b \ a \ 0 \ b \ 0 \ a \ b \ c \ 0 \ .$
A 0 B 1 C 2 D 3
2015-2016
C

$$\begin{aligned}
 & a^2 - b^2 = (a+b)(a-b) \\
 & a^2 - b^2 = (a+b)(a-b) \\
 & a^2 - b^2 = (a+b)(a-b) \\
 & a^2 - b^2 = (a+b)(a-b) \\
 & a^2 - b^2 = (a+b)(a-b)
 \end{aligned}$$

2.

C

64

A B

C D

2020

D

A

B

C

D

D.

65

A B C D

2019 10

D

66 x
A B C D
2018-2019
B

67
A B C D
2018-2019
B

S T .

，
，

$S-T<0, S<T$
B

68

A B C D

2014-2015
D

A , B C
D ,

69

A B C D

2014-2015
B

70 , ()

A B C D

1011
B

B

71 “ ” “ ”

A B

C D

2018 10

B

“ ” “ ” “ ” “ ” “ ” “ ” B.

72

A B C D

2017-2018

D

D.

73

A B C D

2017-2018

D

AB

C

D .

74

A “ $x < 1$ ” “ $\log_2(x+1) < 1$ ”

B “ $\forall x > 0 \ 2^x > 1$ ” “ $\exists x_0 \leq 0 \ 2^{x_0} \leq 1$ ”

C “ $a \leq b \ ac^2 \leq bc^2$ ”

D “ $a + b \neq 5 \ a \neq 2 \ b \neq 3$ ”

2017

D

A $\log_2(x+1) < 1 \Leftrightarrow 0 < x+1 < 2 \Leftrightarrow -1 < x < 1$ “ $x < 1$ ” B “ $\forall x > 0 \ 2^x > 1$ ” “ $\exists x_0 > 0 \ 2^{x_0} \leq 1$ ” C “ $a \leq b \ ac^2 \leq bc^2$ ” “ $ac^2 \leq bc^2 \ a \leq b$ ” $c=0$ D “ $a = 2 \ b = 3 \ a + b = 5$ ” D

75 , ()

A B C D

2017-2018 4

C

C

76

A B C D

2018

A

A

77 “ ” “ ”

A B

C D

2016-2017

C

, C.

1 2 .

78 a b c a b c ()

A a>c>b B b>a>c

C a>b>c D c>b>a

A 04

C

C

79 $a, b \in R_+, a \neq b \quad a^3 + b^3 > a^2b + ab^2 \quad a, b, m \in R_+, a < b \quad \frac{a+m}{b+m} < \frac{a}{b}$
 $\frac{a}{c^2} > \frac{b}{c^2} \quad a > b \quad x \in (0, \frac{\pi}{2}) \quad \sin x + \frac{2}{\sin x} \geq 2\sqrt{2}$

A 1 B 2 C 3 D 4

2019-2020 10

B

.

$a, b \in R_+, a \neq b \quad (a^3 + b^3) - (a^2b + ab^2) = (a - b)^2(a + b) > 0 \quad a^3 + b^3 > a^2b + ab^2$

$a, b, m \in R_+, a < b \quad \frac{a+m}{b+m} - \frac{a}{b} = \frac{m(a-b)}{b(b+m)} > 0 \quad \frac{a+m}{b+m} < \frac{a}{b}$

$\frac{a}{c^2} > \frac{b}{c^2} \quad c^2 \quad a > b$

$x \in (0, \frac{\pi}{2}) \quad \sin x + \frac{2}{\sin x} \geq 2\sqrt{2} \quad \sin x = \frac{2}{\sin x} \quad \sin x = \sqrt{2}$

B.

80

A B C D

2019-2020

C

A

BD

C

C

81

A B C D

2017-2018

A

$$+3 = + + v + 2$$

$$= + v + + 2v$$

$$= 1 v = 2$$

$$1 \quad 1 \quad 2 \quad 2 \quad + 4 \quad 6$$

$$1 \quad + 3 \quad 7$$

$$+ 3 \quad [1 \quad 7]$$

A

82

A B C D

2019-2020

C

C

83

A B C D

2017-2018 12

D

A

B

C

D.

84 a 0 b 0 a+b=4

A B + 1 C 2 D

[]2014 B 4-5 1.2

D

ab == A B C

a 0 b 0 a+b=4

ab

A

B

C

ab 4 a+b=4 16 2ab 8

== D

D

85

6 3

24 4 5

22 2 3

A 3 B 2 C D

2019-2020 6

B

1 1

.

1 1

.

2 .

B

.

86 $0 < a < b$ $a + b = 1$ $b - 2ab$

A B $b - C - 2ab$ D

2020

B

0

1

2

3

87

A B

C D

2019-2020

C

.
C.

88

A B C D

2018-2019

A

.
.

89

;;

A B C D

2019-2020

B

90

A B C D

2019-2020 2-10

D

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.

, ,

D

.

,

91

A B

C D

2019

D

D A,B,C .

;
-c ;
,
,, D D.

92

A B C D
2018-2019
D

a=0
a=2n+1
x>y, -x<-y,0<c-x<c-y, ,

D

93

A B
C D
2018-2019
A

A B C D .

A

A

B

B

C

C

D

D . A.

1 2 3 4 .

94 a b c R

A $ac > bc$ $a > b$ B $a > b$ $a > b$

C $a > b$ D $a > b$

D

$ac > bc$ $c > 0$ $a > b$ $|a| > |b|$ $a > b$ $a < 0 < b$; $a > b$ D.

95 $a < b$ $d < c$ $(c a)(c b) < 0$ $(d a)(d b) > 0$ a b c d ()

A $d < a < c < b$ B $a < d < c < b$

C $a < d < b < c$ D $d < c < a < b$

2019

25

A

$a < b$ $(c a)(c b) < 0$ $a < c < b$ $(d a)(d b) > 0$ $d < a < b$ $a < b < d$ $d < c$ $d < a < b$. $d < a < c < b$. A.

96

A B C D

2018

D

D.

97 $a>b>1\ c<0$:
.

A 1 B 2 C 3 D 4

B

.

R .
2 B.

. 1 2 3 4 .

98

A B C D

2015-2016 5.8
D

$x_1\ y_1\ x_2\ y_2\ \mathbb{R}$.

99 $p\ q$

A B

C D

2015-2016

A

$p \vee q \quad \neg x \quad p \quad q \vee q \quad p$

P

$q \rightarrow 0 \times 1$

$p \vee q \quad q \vee p$

$p \vee q$

A

100 $x \neq 0$ a ()

A a B a C a D a

2019-2020 9

A

$x \neq 0$ x .

$x \neq 0$

$x \neq 0$

.

A

.

101

A B

C D

2020-2021

C

C

102

A B C D

2020-2021

A

$c\ b$ b .

A

103

A B

C D

D

D ABC .

D

AB C .

D.

104 ()

A

B “ ” “ ”

C

D

2018

D

“ ” “ ”

D

105 $\int_a^b x^2 dx = \frac{1}{3} b^3 - \frac{1}{3} a^3$

A $\frac{1}{3} b^3 - \frac{1}{3} a^3$ B $\frac{1}{3} b^3 + \frac{1}{3} a^3$ C $\frac{1}{3} b^3 - \frac{1}{3} a^3$ D $\frac{1}{3} b^3 + \frac{1}{3} a^3$

2019

B

106

A $\frac{1}{3} b^3 - \frac{1}{3} a^3$ B $\frac{1}{3} b^3 + \frac{1}{3} a^3$

C $\frac{1}{3} b^3 - \frac{1}{3} a^3$ D $\frac{1}{3} b^3 + \frac{1}{3} a^3$

2017-2018

B

B .

107 ,

A B C D

2018 3

B

$0 \ll 1, > 1, < 0, b > a > c, B.$

108 ()

A ,

B ,

C ,

D

2.1

C

A , A

B , B

C , , C

D D

C .

C.

109

A B C D

2018-2019

A

A $B C D$

$a \ 0 \ |a| \ a \ a \ b \ 0 \ a \ b \ 0 \ |a| \ b \ A$

$a \ 2 \ b \ 1$

B

C

D

A

110

A B C D

2019

B

. . B.

111 ()

A B

C D

2018-2019

C

A

B

C

D

C.

112

A B C D

2017-2018

A

A.

113

A B

C D

2015

B

$f(x) - 1$

R P Q B

114 () *a*

A B C D

2021

A

=

=

A

115 4 5 22 6 3 24 2 3

A 2 B 3 C D

2019-2020

A

, , .

, , ,

, , .

, , .

, 2 .

A

, . . .

116

A B C D

2019-2020

C

.

C.

.

117 ()

A B

C D

2018-2019

D

4

$a\ b\ 0\ A$

$0\ c\ 1\ c^a\ c^b\ c\ 1\ c^a\ c^b\ c\ 1\ c^a\ c^b\ c^a\ c^b\ B$

$a\ b\ 0\ c\ 0\ ac\ bc\ 0\ C$

D

D

118

A B

C D

2019 5

D

a b c

A

B

C

D

119

A B

C D

2.4 1

C

.

C.

“ ”

.

120

A B

C D

2019 12

B

.

.

B

.

121 (2018 ·) a b c R a b c 0 abc>0 T ()

A T>0 B T<0

C T 0 D T 0

2018 43
B

$a^2 b c 1$
 $A C D$
 B .

122
A B C D
2020
D

A B C D .

A A
B B
C C
D

D
D

123
A B C D
2019-2020
A

B C D A

A A
 B B
 C C
 D D ,
 A

124 A,B,C
A B C D
 2018
 B

$A>C$
 $B<C$
 $A>C>B$.
 B .

125
A B C D
 2017 5
 C

C.
 . “ ”

126
A B C D
 2016-2017
 A

A.

.

127

A.4 B.3

C.2 D.1

2016-2017

C

. C. .

128

$$a\,b\,a\,b\,a^3\,b^3\,a^2\,b\,ab^2$$

$$a\,b\,m\,a\,b$$

$$a\,b$$

$$x\sin x\,2$$

$$(\quad)$$

A 0 B 1 C 2 D 3

2017-2018

C

$$,a,b\in R+\,a\,b$$

$$>$$

$$,a,b,m\in R+\,a<b$$

$$-$$

$$,\,a\,b$$

$$,$$

$$\sin x=$$

. C.

129

A B

C D

2019-2020

B

B

A

C D .

B

130

A B C D

2019-2020

B

B.

131

A B C D

2018-2019

D

D.

132

A B

C D

A

A.

133

A B C D

2017-2018

C

A

B

D

C .

C .

134 $a, b \in \mathbb{R}$ ()

A $a, b, a^2, b^2 \in \mathbb{R}$ B $|a|, b, a^2, b^2 \in \mathbb{R}$

C $a, |b|, a^2, b^2 \in \mathbb{R}$ D $a, |b|, a^2, b^2 \in \mathbb{R}$

C

$a=1, b=-1, a^2=b^2$, A

$|a|=1, b=-1, a^2=b^2$ B

$$a \mid b \mid a^2 \mid b|^2=b^2 \quad \text{C}$$

$$a=-1 \quad b=1 \quad a \mid b \mid a^2=b^2 \quad \text{D}$$

C.

135

A B

C D

2019-2020

D

$$A \quad B \quad C \quad f(x) = x^3 \quad D$$

$$c \neq 0 \quad ac^2 \neq bc^2 \neq 0 \quad A$$

B

$$C$$

$$f(x) = x^3 \quad a^3 \neq b^3 \quad a \neq b \quad ab > 0 \quad a \neq b \quad D$$

D

136 R

$$()$$

A B C D

16 5 -

B

B
137
A B C D
 2017-2018
 A

$4 > 2$; ; ; A.
138 2017-2018
A $\lg(x^2) > \lg x$ ($x > 0$) **B** $x + 2(x - 0)$
C $a^3 + b^3 = a^2b + ab^2$ ($a, b \in R$) **D** $a^4 + b^4 = a^3b + ab^3$ ($a, b \in R$)
 — 13

D
 , , , A ; , , B ; , C ; , D

139
A 8 B C 4 D 2
 2015
 C.

1. 2. .
140 ()

A B C D

2016-2017

A

,
, .
A

141 $a > b$ ()

A $a^2 > b^2$ B $\lg(a \cdot b) > 0$ D

2014-2015

D

A B C D

142 , , ()

A B C D

2019

D

D.

1 2 3 .

143

·
A 1 B 2 C 3 D 4

2019-2020 10

C

·
3 .
C.

1. 2. 3. 4. .

144 , , ()

A B

C D

2019-2020

A

M N .

·
A

145

A B C D

2020

A

’ ’

A.

146

A B C D

2017-2018

C

A A

B B

C C

D D

C.

. 1 2 3 .
147
A B
C D
 2018-2019
 C

.
148
A B C D
 2018
 D

A
 B
 C
 D .

149
A B C D
 2017-2018
 D

A B C D .
A B C
D.

150

A B C D
2016-2017
D

151

A 1 B 2 C 3 D 4
A 2019
C

C

152

A B C D

2018

D

$a=2, b=4, c=3, d=2, d-a=0, c-b=-1, d-a>c-b, A \quad a=2, b=3,$
 $, B \quad b=3, a=c=1, d=-3, C \quad D \quad D .$

D.

153 = , ,

A B C D

2017-2018

D

, , ,

, ,

, ;

$a<0$, ,

, , ,

, ,

a .

154

A B C D

2017

B

B.

155

A B C D

2017

D

A

B

D

D

0 1

“ ”

156 $a > b > 0$

A $a + \frac{1}{b} > b + \frac{1}{a}$ **B** $a + \frac{1}{a} > b + \frac{1}{b}$ **C** $\frac{b}{a} > \frac{b+1}{a+1}$ **D** $b - \frac{1}{b} > a - \frac{1}{a}$

2014

A

$\because (a + \frac{1}{b}) - (b + \frac{1}{a}) = (a - b) + (\frac{1}{b} - \frac{1}{a}) = (a - b) + \frac{a-b}{ab} = \frac{(a-b)(ab+1)}{ab} \because a > b > 0$
 $\therefore a - b > 0 \quad ab > 0 \therefore ab + 1 > 1 > 0 \therefore (a + \frac{1}{b}) - (b + \frac{1}{a}) = \frac{(a-b)(ab+1)}{ab} > 0 \therefore a + \frac{1}{b} >$
 $b + \frac{1}{a}$ **A** $a = 1 \quad b = \frac{1}{2} \quad a + \frac{1}{a} = 1 + \frac{1}{1} = 2 \quad b + \frac{1}{b} = \frac{1}{2} + 2 = \frac{5}{2} \quad a +$
 $\frac{1}{a} > b + \frac{1}{b}$ **C** $\frac{b}{a} > \frac{b+1}{a+1} \quad b(a+1) > a(b+1) \quad ab + b > ab + a \Rightarrow b >$
 a **D** $b - \frac{1}{b} > a - \frac{1}{a} \quad b + \frac{1}{a} > a + \frac{1}{b}$ **A** **A.**

157 $x, y \in R$ “ $x > y > 0$ ” “ $\frac{x}{y} > 1$ ”

A **B**

C **D**

2016-2017

A

$\because x > y > 0 \therefore \frac{1}{y} > 0 \therefore x \cdot \frac{1}{y} > y \cdot \frac{1}{y} \quad \frac{x}{y} > 1, \quad x > y > 0 \quad \frac{x}{y} > 1$
 $x = -2, y = -1 \quad \frac{x}{y} > 1 \quad x < y, \quad x > y > 0 \quad \frac{x}{y} > 1$ **A**