

本文 2019 年度福建省基础教 程教学研 《核心 养导向下 中
 数学 教学模式的研 》 (号:MJYKT2019-106)的研 成果.

$$ABC \quad A \quad B \quad C \quad a \quad b \quad c$$

$$a \cos B + b \cos A = c$$

$$\frac{2c-b}{\cos B} = \frac{a}{\cos A} \quad c \cos A = 2b \cos A - a \cos C \quad 2a - \frac{b \cos C}{\cos A} = \frac{c \cos B}{\cos A}$$

$$a=7 \quad b=5 \quad \underline{\hspace{2cm}} \quad ABC$$

$$2c \cos A = b \cos A + a \cos B \quad 2c \cos A = c \quad A = \frac{\pi}{3}$$

$$2b \cos A = a \cos C + c \cos A \quad a \cos C + c \cos A = b \quad 2b \cos A = b$$

$$A = \frac{\pi}{3}$$

$$2a \cos A = b \cos C + c \cos B \quad A = \frac{\pi}{3}$$

$$A = \frac{\pi}{3}$$

$$\begin{array}{l} A \quad ABC \\ c = 8 \quad a + b + c = 20 \end{array} \quad \begin{array}{l} a^2 = b^2 + c^2 - 2bc \cos A = 25 + c^2 - 5c = 49 \\ ABC \quad 20 \end{array}$$

$$\{a_n\} \quad n \quad S_n \quad \{b_n\}$$

$$a_1 = b_4 \quad \text{---} \quad b_2 = 8 \quad b_1 - 3b_3 = 4 \quad k \quad \left\{ \frac{1}{S_n} \right\} \quad k \quad T_k > \frac{15}{16}$$

$$\begin{array}{l} k \\ S_4 = 20 \quad S_3 = 2a_3 \quad 3a_3 - a_4 = b_2 \end{array}$$

$$\{b_n\} \quad q (q > 0) \quad b_1 = \frac{8}{q} \quad b_3 = 8q$$

$$\frac{8}{q} - 3 \times 8q = 4 \quad 6q^2 + q - 2 = 0 \quad q = \frac{1}{2} \quad q = -\frac{2}{3}$$

$$a_1 = b_4 = 2 \quad S_4 = 4a_1 + \frac{4 \times 3}{2} d = 20 \quad d = 2$$

$$S_n = 2n + \frac{n(n-1)}{2} \times 2 = n^2 + n \quad \frac{1}{S_n} = \frac{1}{n(n+1)} = \frac{1}{n} - \frac{1}{n+1}$$

$$T_k = \frac{1}{S_1} + \frac{1}{S_2} + \dots + \frac{1}{S_k} = \left(1 - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \dots + \left(\frac{1}{k} - \frac{1}{k+1}\right) = 1 - \frac{1}{k+1}$$

$$1 - \frac{1}{k+1} > \frac{15}{16} \quad k > 15 \quad k \quad k \quad 16$$

$$a_1 = b_4 = 2 \quad 3a_1 + \frac{3 \times 2}{2} d = 2(a_1 + 2d) \quad a_1 = d = 2$$

$$a_1 = b_4 = 2 \quad 3(a_1 + 2d) - (a_1 + 3d) = 8 \quad d = \frac{4}{3}$$

$$S_n = 2n + \frac{n(n-1)}{2} \times \frac{4}{3} = \frac{2}{3}n^2 + \frac{4}{3}n \quad \frac{1}{S_n} = \frac{3}{2} \times \frac{1}{n(n+2)} = \frac{3}{4} \left(\frac{1}{n} - \frac{1}{n+2} \right)$$

$$T_k = \frac{3}{4} \left[\left(1 - \frac{1}{3}\right) + \left(\frac{1}{2} - \frac{1}{4}\right) + \dots + \left(\frac{1}{k-1} - \frac{1}{k+1}\right) + \left(\frac{1}{k} - \frac{1}{k+2}\right) \right]$$

$$= \frac{3}{4} \left(1 + \frac{1}{2} - \frac{1}{k+1} - \frac{1}{k+2}\right) = \frac{9}{8} - \frac{3}{4} \left(\frac{1}{k+1} + \frac{1}{k+2}\right) \quad T_k > \frac{15}{16}$$

$$\frac{1}{k+1} + \frac{1}{k+2} < \frac{1}{4} \quad k \quad k \geq 7 \quad k \quad 7$$

$$\{a_n\} \quad a_1 \quad d \quad S_n \quad \left\{\frac{1}{S_n}\right\} \quad k$$

$$T_k \quad T_k > \frac{15}{16} \quad k$$

$BM = 2MA \quad AN = 2NC$
 ABC
 $3 \quad M \quad N$
 $AB \quad AC$
 $AMN \quad MN$
 $A'MN$

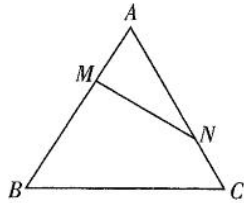


图1

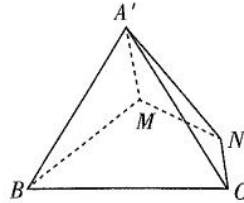


图2

$A'BM \perp BCNM$
 $A'M \perp BC \quad A' - MN - C \quad 60^\circ \quad A'B = \sqrt{7}$

$BC \quad P \quad PA' \quad A'BM \quad \frac{3\sqrt{10}}{10}$

PB

$A'M \perp BC \quad A'M \perp MN \quad BC \quad MN$
 $A'M \perp BCNM \quad M \quad MB \quad MN \quad MA' \quad x \quad y \quad z$

$$A'(0,0,1) \quad P(2-a, \sqrt{3}a, 0) \quad 0 \quad a \quad \frac{3}{2} \quad \overline{A'P} = (2-a, \sqrt{3}a, -1)$$

$A'BM \quad n = (0,1,0) \quad PA' \quad A'BM \quad \theta$

$$\left| \begin{array}{c} \langle \quad \rangle \\ \left(\quad \right) - \end{array} \right. \quad \sqrt{\quad}$$

$\angle A'MB$ $A' - MN - C$ $\angle A'MB = 60^\circ$

A' $A'O \perp BM$ O $A'O \perp BCNM$ $BCNM$ $OD \perp OB$

D BM O OB OD OA' x y z

$$A' \left(0, 0, \frac{\sqrt{3}}{2} \right) \quad P \left(\frac{3}{2} - a, \sqrt{3}a, 0 \right) \quad 0 \quad a \quad \frac{3}{2} \quad \overline{A'P} = \left(\frac{3}{2} - a, \sqrt{3}a, -\frac{\sqrt{3}}{2} \right)$$

$A'BM$ $\mathbf{n} = (0, 1, 0)$ PA' $A'BM$ θ

$$\sin \theta = \left| \cos \langle \overline{A'P}, \mathbf{n} \rangle \right| = \frac{\sqrt{3}a}{\sqrt{\left(\frac{3}{2} - a\right)^2 + 3a^2 + \frac{3}{4}}} = \frac{3\sqrt{10}}{10} \quad a = \frac{3}{2}$$

P $PB = 3$

$A'BM$ $\angle A'MB = 120^\circ$ A' $A'O \perp BM$ O

$A'O \perp BCNM$ O OB OD OA' x y z

$$A' \left(0, 0, \frac{\sqrt{3}}{2} \right) \quad P \left(\frac{5}{2} - a, \sqrt{3}a, 0 \right) \quad 0 \quad a \quad \frac{3}{2} \quad \overline{A'P} = \left(\frac{5}{2} - a, \sqrt{3}a, -\frac{\sqrt{3}}{2} \right)$$

$A'BM$ $\mathbf{n} = (0, 1, 0)$ PA' $A'BM$ θ

$$\sin \theta = \left| \cos \langle \overline{A'P}, \mathbf{n} \rangle \right| = \frac{\sqrt{3}a}{\sqrt{\left(\frac{5}{2} - a\right)^2 + 3a^2 + \frac{3}{4}}} = \frac{3\sqrt{10}}{10} \quad a = \frac{15 \pm \sqrt{57}}{4} \quad \frac{3}{2}$$

P

$BCNM$

a

P

$$y^2 = 2px \quad (p > 0)$$

F

x C

A B D D

$$|DF| = 4 \quad |CD| = 4\sqrt{2}$$

p

O

$$k_{OA} + k_{OB} = -2$$

$$k_{AD} k_{BD} = a$$

AB

a

$$p = 4$$

$D(2, 4)$

$$AB: \lambda y = x + m \quad A \left(\frac{y_1^2}{8}, y_1 \right)$$

$$B \left(\frac{y_2^2}{8}, y_2 \right) \quad \begin{cases} \lambda y = x + m \\ y^2 = 8x \end{cases} \Rightarrow y^2 - 8\lambda y + 8m = 0 \quad y_1 + y_2 = 8\lambda \quad y_1 y_2 = 8m$$

$$k_{OA} + k_{OB} = \frac{8}{y_1} + \frac{8}{y_2} = \frac{8(y_1 + y_2)}{y_1 y_2} = \frac{8\lambda}{m} = -2 \Rightarrow m = -4\lambda$$

$$AB: \lambda y = x - 4\lambda \quad (0, -4)$$

$$k_{AD} k_{BD} = \frac{y_1 y_2 + 16 - 4(y_1 + y_2)}{\frac{(y_1 y_2)^2}{64} + 4 - \frac{1}{4}[(y_1 + y_2)^2 - 2y_1 y_2]} = \frac{8}{(m + 2 + 4\lambda)}$$

$$m = -4\lambda \quad k_{AD} k_{BD} = 4 \quad a \quad 4$$

AB

$$(0, -4)$$

a

$$f(x) \quad (0, +\infty) \quad f'(x) = \frac{2}{x} f(x) \quad f(1) = 4 \quad f(2) = 16$$

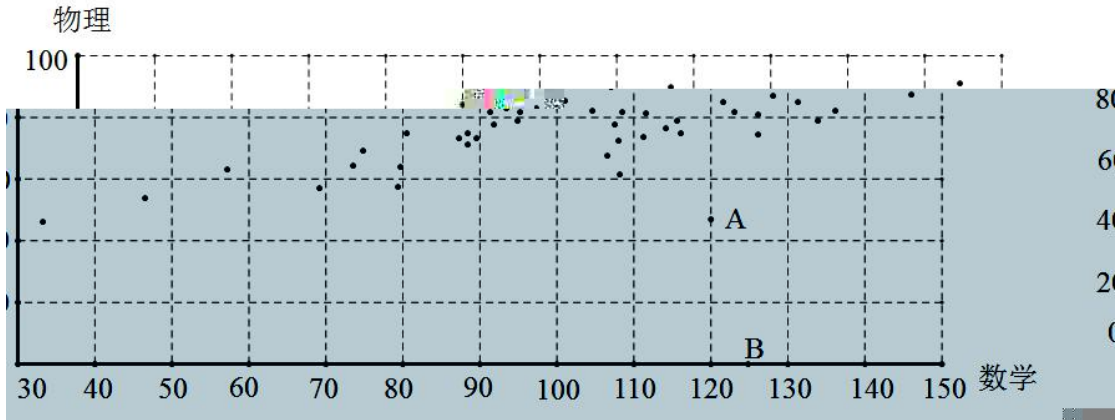
A $f\left(\frac{3}{2}\right) = 8$ B $f(3) = 40$ C $f(4) = 72$ D $f(5) = 120$

$$g(x) = \frac{f(x)}{x^2} \quad g'(x) = \frac{f'(x)x^2 - f(x)2x}{x^4} = \frac{x(f'(x)x - 2f(x))}{x^4} = 0$$

$$g(x) \quad g(1) = \frac{f(1)}{1^2} = 4 \quad g(2) = \frac{f(2)}{2^2} = 4 \quad g(x)$$

$$[1, 2] \quad g\left(\frac{3}{2}\right) = 4 = \frac{f\left(\frac{3}{2}\right)}{\frac{9}{4}} \quad f\left(\frac{3}{2}\right) = 9$$

$$(3) \quad 4 \quad (7, 4) \quad 4 \quad (4) \quad 64$$



$y \quad x$

$A \quad B$

A

B

$$\sum_{i=1}^{42} x_i = 4641 \quad \sum_{i=1}^{42} y_i = 3108 \quad \sum_{i=1}^{42} x_i y_i = 350350 \quad \sum_{i=1}^{42} (x_i - \bar{x})^2 = 13814.5$$

$$\sum_{i=1}^{42} (y_i - \bar{y})^2 = 5250 \quad x_i \quad y_i \quad 42 \quad i=1$$

$$2 \quad 42 \quad y \quad x \quad r = 0.82$$

$A \quad B$

44

$y \quad x$

$$r_0 \quad r_0 \quad r$$

$$r_0 \quad r$$

$y \quad x$

$A \quad B$

44

42

42

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44

