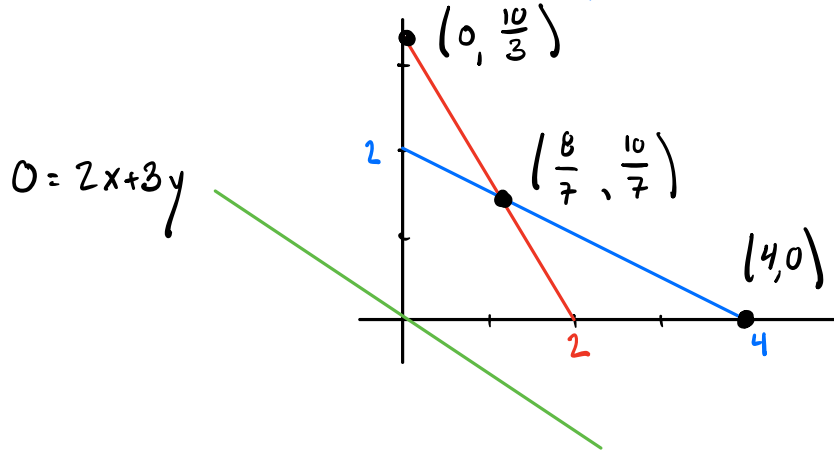**Natural Science** A certain predator requires at least 10 units of protein and 8 units of fat per day. One prey of Species I provides 5 units of protein and 2 units of fat; one prey of Species II provides 3 units of protein and 4 units of fat. Capturing and digesting each Species II prey requires 3 units of energy, and capturing and digesting each Species I prey requires 2 units of energy. How many of each prey would meet the predator's daily food requirements with the least expenditure of energy? Are the answers reasonable? How could they be interpreted?

		PROTEIN	FAT	ENERGY
x	SPECIES I	$5x$	$2x$	$2x$
y	SPECIES II	$3y$	$4y$	$3y$

CONSTRAINTS: $5x + 3y \geq 10$ MINIMIZE: $E = 2x + 3y$

vs

$2x + 4y \geq 8$

$0 = 2x + 3y$

$\left(0, \dfrac{10}{3}\right)$

$\left(\dfrac{8}{7}, \dfrac{10}{7}\right)$

$(4,0)$

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§3.1 SIMPLE INTEREST

Def: INTEREST IS FEE PAID TO USE SOMEONE ELSE'S MONEY.

PRINCIPAL IS THE AMOUNT BORROWED/DEPOSITED.

SIMPLE INTEREST IS CALCULATED BASED ON PRINCIPAL ONLY.

RATE OF INTEREST r (ANNUAL INTEREST RATE) IS THE PROPORTION OF THE PRINCIPAL EARNED/PAID IN 1 YEAR (EACH YEAR).

NOTE: IN CALCULATIONS r IS ALWAYS WRITTEN AS A DECIMAL

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1 YEAR: $I = Pr$

t YEARS: $I = Prt$ (t CAN BE A FRACTION)

UNIT

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ex. CALCULATE THE SIMPLE INTEREST OWED ON A 4 MONTH LOAN OF $\$1500$ THAT CHARGES 9% INTEREST RATE. WHAT IS THE AMOUNT REPAID?

$$\boxed{\text{AMOUNT} \quad A = P + I = P + Prt = P(1+rt)}$$

ex. IF $2,000 EARNS $73.85 SIMPLE INTEREST IN 30 WEEKS, WHAT IS THE INTEREST RATE ON THIS INVESTMENT/LOAN?

50. Jerry Ryan borrowed $8000 for nine months at an interest rate of 7%. The bank also charges a $100 processing fee. What is the actual interest rate for this loan?

43. Tuition of $1769 will be due when the spring term begins in 4 months. What amount should a student deposit today, at 3.25%, to have enough to pay the tuition?

> **Present Value for Simple Interest**
>
> The **present value** P of a future amount of A dollars at a simple interest rate r for t years is
>
> $$P = \frac{A}{1 + rt}.$$

Example 6   Because of a court settlement, Jeff Weidenaar owes $5000 to Chuck Synovec. The money must be paid in 10 months, with no interest. Suppose Weidenaar wants to pay the money today and that Synovec can invest it at an annual rate of 5%. What amount should Synovec be willing to accept to settle the debt?

Example 7   Larry Parks owes $6500 to Virginia Donovan. The loan is payable in one year at 6% interest. Donovan needs cash to pay medical bills, so four months before the loan is due, she sells the note (loan) to the bank. If the bank wants a return of 9% on its investment, how much should it pay Donovan for the note?