Business Mathematics
Class notes
Fire Insurance (section 13.3)

Companies take out **fire insurance** to protect them against the unlikely but sometimes devastating loss due to a fire. Lenders require that fire insurance be purchased on a building or home. **Other insurance plans** (homeowner's, car, life, disability, liability, long-term health, health, renter's, and others) protect individuals from possible risk and may be mandatory by law. We will focus here on fire insurance.
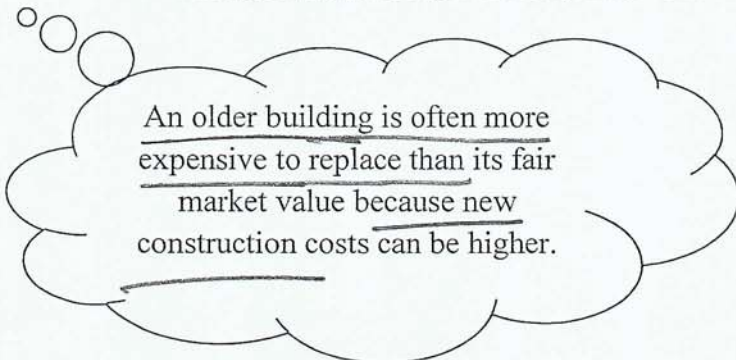
Definitions: The contract between an insurance company and the owner of a building is called an **insurance policy**. A basic fire policy provides **coverage** or protection for the owner and mortgage holder of the building. The owner can also purchase coverage on the **contents** of the building. **Liability insurance** covers them when someone gets hurt on the property. A **claim** is filed when a loss occurs and the insured requests payment from the insurance company.

The **face value** of a policy is the dollar amount of the insurance coverage. The annual cost of the policy is the **premium**. The premium is based on things like the age of the building, construction materials, location, local crime rate, safety features like sprinkler systems, history of insurance on the property, etc.

Finding annual premiums:
We will factor in location (territorial rating) and the age, construction material, and general condition of a building (building classification) when figuring how much to charge for insurance. Real-life insurance companies use **underwriters** and take more into account.

Replacement cost refers to the cost to replace (rebuild) a building in the event it's completely destroyed.

1

Here is the table we will use to figure annual premiums. Notice that the building and contents are dealt with separately.

Annual Rates for Each $100 of Insurance

| Territorial Rating | Building Classification | | | | | |
| | A | | B | | C | |
	Building	Contents	Building	Contents	Building	Contents
1	$0.25	$0.32	$0.36	$0.49	$0.45	$0.60
2	$0.30	$0.44	$0.45	$0.55	$0.54	$0.75
3	$0.37	$0.46	$0.54	$0.60	$0.63	$0.80
4	$0.50	$0.52	$0.75	$0.77	$0.84	$0.90
5	$0.62	$0.58	$0.92	$0.99	$1.05	$1.14

The table entries will be multiplied by the replacement cost divided by $100.

expl 1: Find the total annual premium for the following customer.
Bob's Hardware has a territorial rating of 4 and a building classification of C. The building value is set at $2,325,000 with contents valued at $111,500.

> First, divide the values by $100. Then, multiply those numbers by the appropriate table entry. Premiums for the building and contents are figured separately and then added.

building: $\dfrac{2,325,000}{100}$ = 23,250 * 0.84

$= \$19,530$

contents: $\dfrac{111,500}{100}$ = 1,115 * 0.90

$= \$1003.50$

annual premium
= 19530 + 1003.50
= $\$20,533.50$

2

Coinsurance:

Most fires do *not* destroy the *entire* building and contents. For that reason, companies are allowed to save money by buying insurance for only a portion of the building and contents value. Most fire insurance policies have a **coinsurance clause**. Effectively, the business assumes some of the risk.

> Most contracts on commercial buildings have an 80% coinsurance clause. The business needs to have a policy with a face value of at least 80% of the building's replacement cost.

If the policy has a face value of at least 80% of the replacement cost, the insurance company will pay for all losses. If the policy has a face value that is less than 80% of the replacement cost, the insurance company will only pay a portion of the loss as found with this formula.

Finding Insurance Company Payout (if face value is less than 80% of replacement cost):

$$\text{Amount insurance company pays} = \text{Amount of loss} \times \frac{\text{Amount of policy}}{80\% \text{ of replacement cost}}$$

Let's see how that works.

expl 2: Find the amount that the insurance company will pay. Assume an 80% coinsurance clause is in place.

a.) Replacement cost of building: $780,000
Face value of policy: $700,000
Amount of loss: $10,400

> What is 80% of the replacement cost? Is their face value enough?

$624,000

The face value ($700,000) is not less than 80% of replace cost ($624,000)

So, insurance company pays for all losses or payout = $10,400.

b.) Replacement cost of building: $780,000
Face value of policy: $585,000
Amount of loss: $10,400

> For how much will the owner be responsible?

The face value ($585,000) is less than 80% of the replace cost ($624,000).

$$\begin{array}{r} 10400 \\ -\ 9750 \\ \hline \$650 \end{array}$$

So, use formula.

3   amt Ins. Co. pays = amt of loss $*$ $\dfrac{\text{amt of policy}}{80\% \text{ of replace cost}}$

$$= 10,400 * \frac{585,000}{\$624,000} = \$9,750 \quad \text{insurance payout}$$

Multiple-carrier Insurance:

A business may have insurance policies with more than one insurance company. When this happens, the insurance companies share the load of paying for the loss in proportion to the amount of coverage the business has with each company.

expl 3: The loss here is insured by multiple carriers. Find the amount paid by each insurance company. Assume that the coinsurance requirement is met.

Insurance Loss: $360,000
Company 1 Coverage: $1,200,000   0.60 (60%)
Company 2 Coverage: $800,000   0.40 (40%)

$$\text{total coverage} = \begin{array}{r} 1,200,000 \\ 800,000 \\ \hline \$2,000,000 \end{array}$$

Find the total coverage. What percent of the coverage is held by each company? They will pay this percentage of the loss.

Company 1 pays 60% of $360,000 (loss)
= $216,000

Company 2 pays 40% of $360,000 (loss)
= $144,000

What if the 80% coinsurance requirement is *not* met?

Each insurance company will pay their proportion of the total amount of payout as figured by the formula on page 3. You are *not* responsible for this scenario but you will see an example in the book.