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**Republic of Iraq**

**Ministry of Higher Education**

**and Scientific Research**

**Al-Mustaqbal University College**

**Computer Engineering Techniques Department**

**Subject: Fundamentals of Electrical Engineering**

**First Class**

**Lecture Six**

**By**

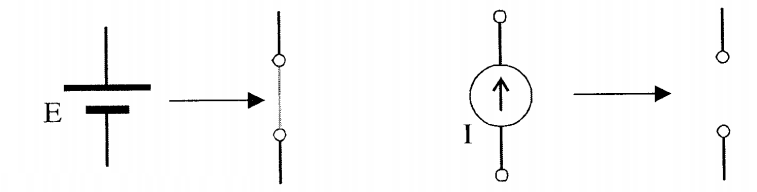
**Dr. Jaber Ghaib**

**MSc. Sarah Abbas**

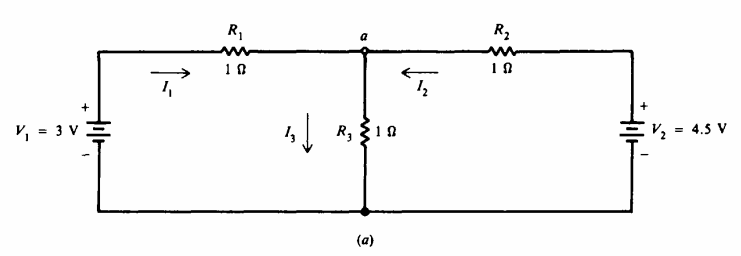
**نظرية التراكيب Superposition Theorem**

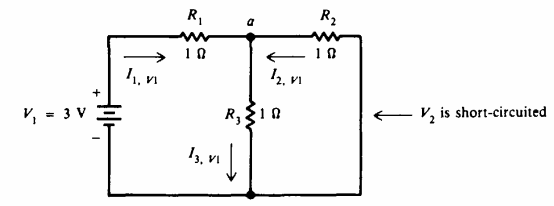
تستخدم نظرية التراكيب لتحليل الدوائر الكهربائية التي تحتوي على مصدري جهد او تيار او اكثر و ميزة هذه الطريقة هي عدم استعمال الطرق الرياضية لايجاد التيارات أو الجهود مقارنه بالطرق الاخرى حيث نتعامل مع كل مصدر للجهد او التيار على حدة وفي النهاية يتم تجميع الحلول لنحصل على حل نهائي و الحصول على النتائج المطلوبة من الدائرة.

في خطوات الحل يتم حذف مصدر الجهد و استبداله بدائرة مغلقة (Short Circuit), ويستبدل مصدر التيار بدائرة مفتوحة(Open Circuit).



**Example 1:** Find branch currents **I1, I2,**and **I3**by the superposition theorem

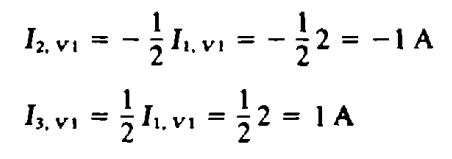
**Solution:** Find the currents produced by voltage source **V1**only.  
Replace voltage source **V2** with a short circuit



In order to calculate the value of I1 we find the equivalent resistance

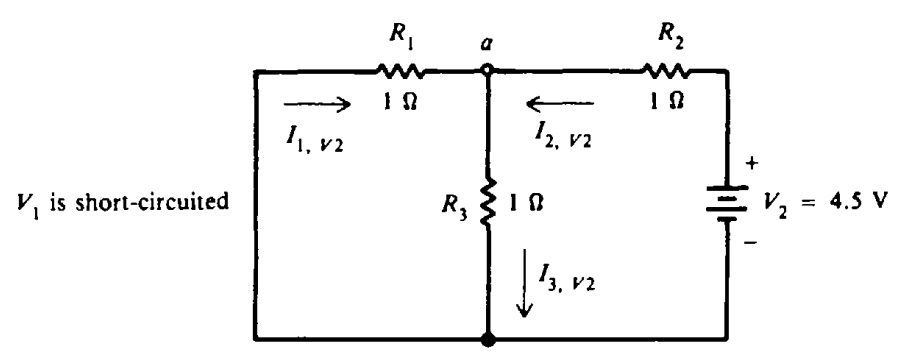
The value of I1 produced by V1

The value of I2 and I3 that produced by V1 are



Find the currents produced by voltage source **V2** only.

Replace voltage source **V1** with a short circuit



So that the value of I1 is

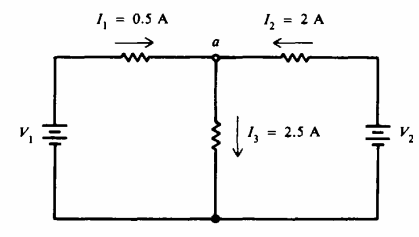
I1 = 2 – 1.5 = 0.5 A

The value of I2 is

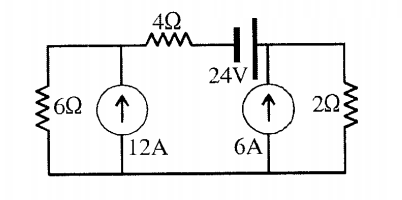
I2 = -1 + 3 = 2 A

The value of I3 is

I2 = 1 + 1.5 = 2.5 A

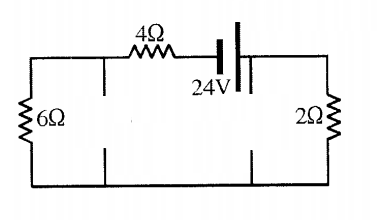


**Example 2:** Using superposition theorem Find the value and direction of current passing through 6 resistance.

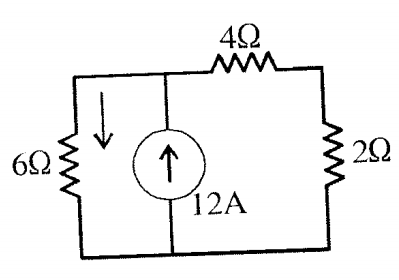


**Solution:**

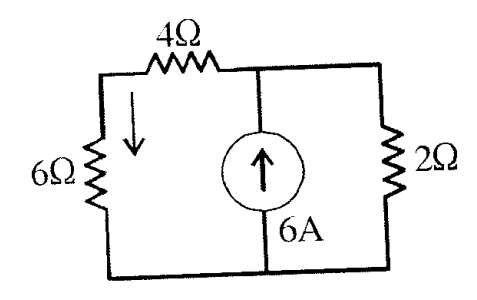
**1-** The effect of 24V source

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**2-** The effect of 12A source

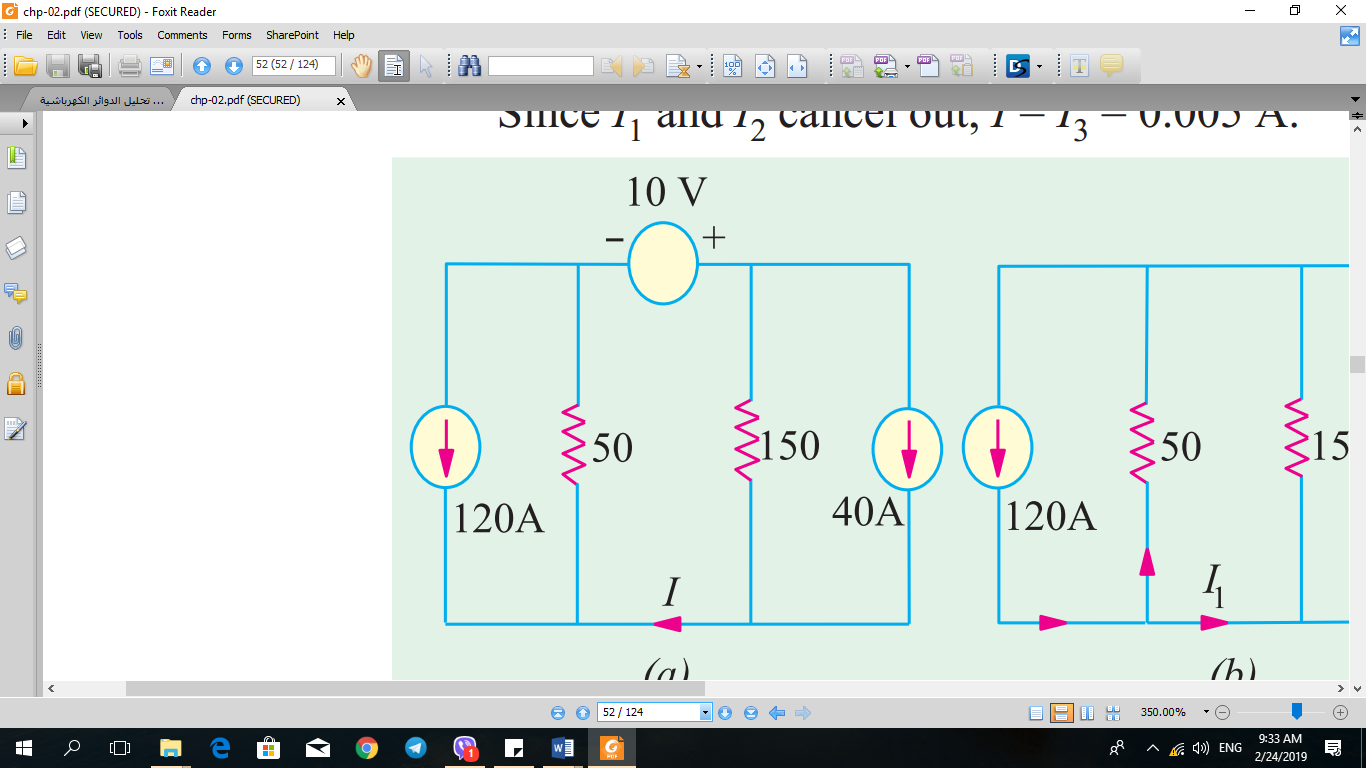


**3-** The effect of 6A source



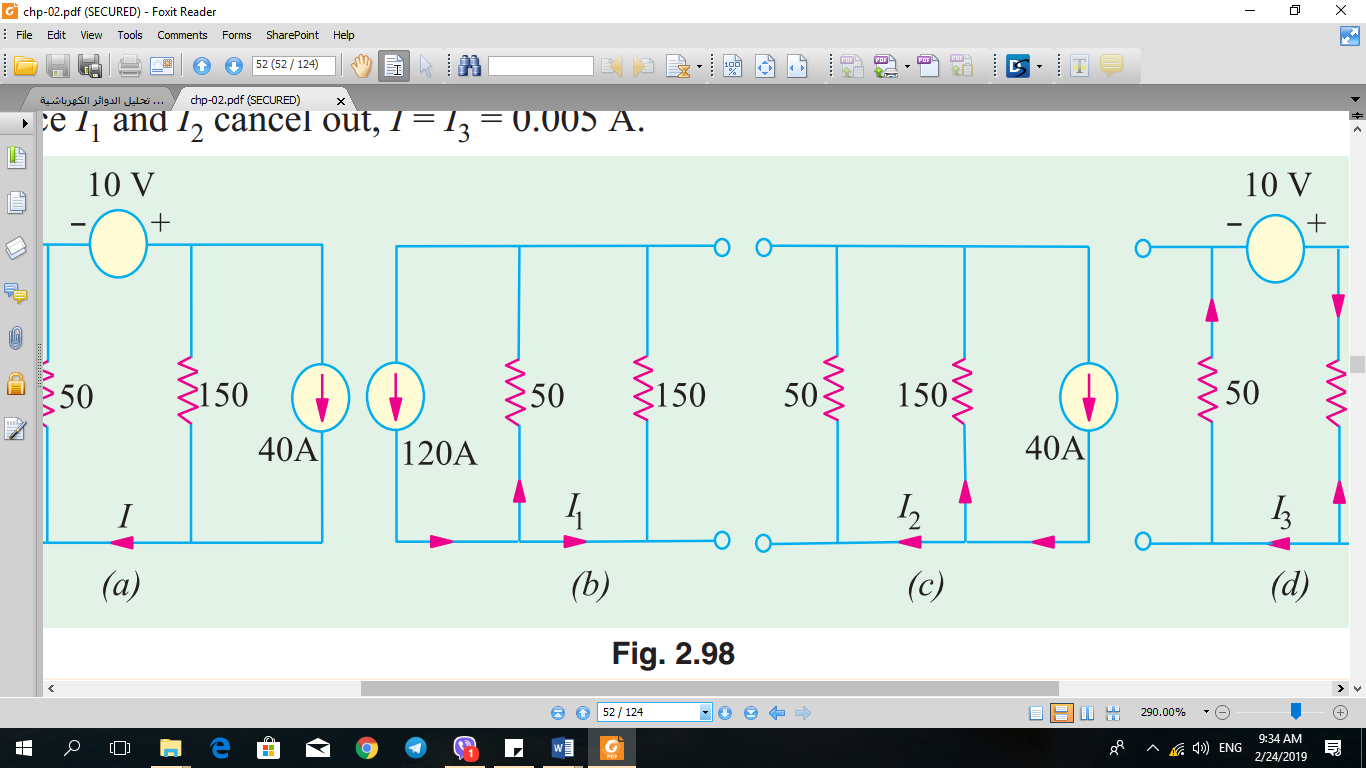
Then the total current is

**Example 3:** Using superposition theorem Find the value and direction of current I.

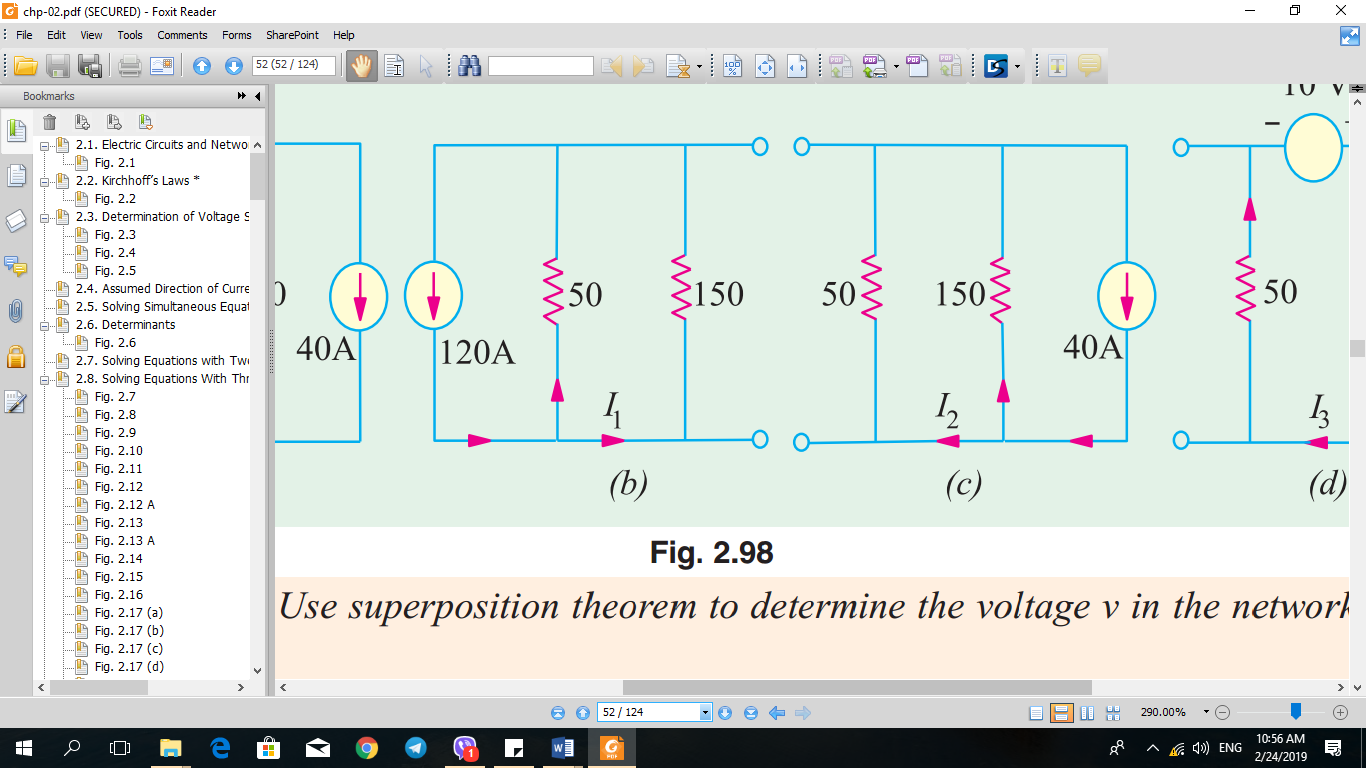


Sol:

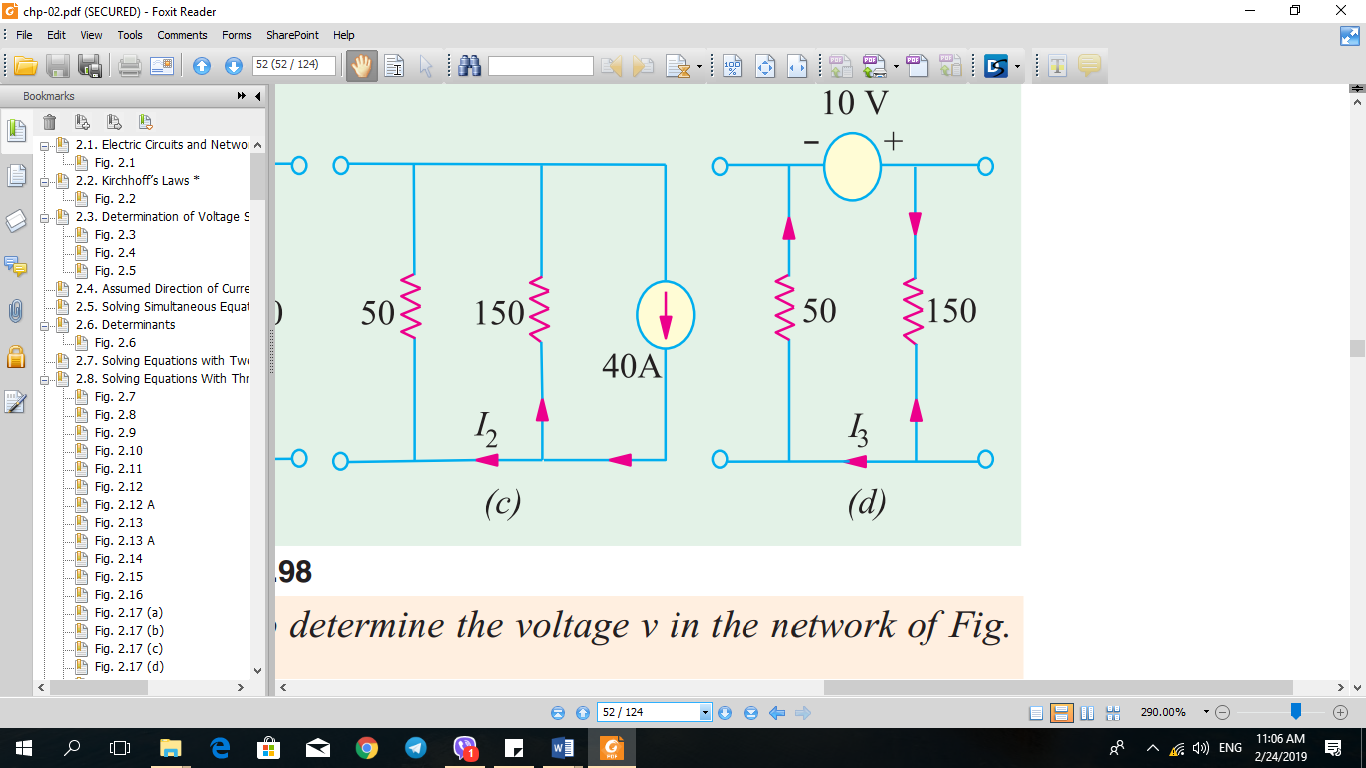
**1-** The effect of 120 A source



**2-** The effect of 40 A source



**3-** The effect of 10V source



The total current with effect of direction